

Ghent University

Faculty of Pharmaceutical Sciences

Department of Bioanalysis

Pharmaceutical Care Unit

**MEDICATION IN RESIDENTIAL CARE FACILITIES FOR INDIVIDUALS WITH INTELLECTUAL DISABILITY:
FOCUS ON ADMINISTRATION THROUGH ENTERAL FEEDING TUBE**

Elke Joos

Pharmacist

Thesis submitted to obtain the degree of Doctor in Pharmaceutical Sciences

2015

Promoter:

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Gent, 2015,

The promotor,

Prof. Dr. Apr. Koen Boussery

The author,

Apr. Elke Joos

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"Gratitude is one of the least articulate of the emotions, especially when it is deep."

-Felix Frankfurter (1882-1965), American Supreme Court Justice-

TABLE OF CONTENTS

CHAPTER 1: GENERAL INTRODUCTION **1**

| | |
|---|-----------|
| 1. INTELLECTUAL DISABILITY | 3 |
| 1.1. Definition & classification | 3 |
| 1.2. Epidemiology | 5 |
| 1.3. Etiology | 5 |
| 1.4. Clinical features | 6 |
| 1.4.1. Presenting symptoms | 6 |
| 1.4.2. Associated conditions | 7 |
| 1.5. Management | 8 |
| 1.5.1. General measures | 8 |
| 1.5.2. Care facilities | 8 |
| 1.5.2.1. European and Belgian setting | 8 |
| 1.5.2.2. Medication management | 10 |
| 2. MANAGING & ADMINISTERING MEDICATION IN RCFs FOR INDIVIDUALS WITH ID | 10 |
| 2.1. Challenges | 10 |
| 2.1.1. Polypharmacy | 10 |
| 2.1.2. Patients with enteral feeding tube | 11 |
| 2.1.2.1. Types of enteral feeding tubes | 11 |
| 2.1.2.2. Drug administration through EFT | 12 |
| 2.1.2.3. Tube occlusion | 23 |
| 2.2. Previous research in this setting | 25 |

OUTLINE AND AIMS OF THE THESIS **31**

CHAPTER 2: MEDICATION MANAGEMENT IN RESIDENTIAL CARE FACILITIES FOR INDIVIDUALS WITH INTELLECTUAL DISABILITY: AN OBSERVATIONAL STUDY **35**

| | |
|---------------------|-----------|
| INTRODUCTION | 37 |
| METHODS | 38 |
| Study design | 38 |
| Sample | 39 |
| Data collection | 39 |
| Data analysis | 40 |

| | |
|--|----------------------|
| RESULTS | 40 |
| Medication management policy | 40 |
| Prescription | 41 |
| Medication ordering and storage | 42 |
| Medication distribution | 43 |
| Medication preparation and administration | 43 |
| Medication management problems according to the staff | 43 |
| DISCUSSION | 44 |
| CONCLUSION | 46 |
| <u>CHAPTER 3: DRUG ADMINISTRATION VIA ENTERAL FEEDING TUBES IN RESIDENTIAL CARE FACILITIES FOR INDIVIDUALS WITH INTELLECTUAL DISABILITY: AN OBSERVATIONAL STUDY</u> | <u>51</u> |
| INTRODUCTION | 53 |
| METHODS | 54 |
| Study design and setting | 54 |
| Data collection | 54 |
| Data analysis | 55 |
| RESULTS | 55 |
| Medication preparation | 56 |
| Medication administration | 58 |
| DISCUSSION | 60 |
| CONCLUSION | 63 |
| <u>CHAPTER 4: DRUG USE AND POTENTIAL DRUG-DRUG INTERACTIONS IN INSTITUTIONALIZED INDIVIDUALS WITH INTELLECTUAL DISABILITY AND TUBE FEEDING</u> | <u>67</u> |
| INTRODUCTION | 69 |
| METHODS | 69 |
| Study design and setting | 69 |
| Data collection and analysis | 69 |
| RESULTS | 70 |
| Medication use | 71 |
| Drug-drug interactions | 72 |
| DISCUSSION | 73 |
| CONCLUSION | 75 |
| <u>CHAPTER 5: DRUG ADMINISTRATION VIA ENTERAL FEEDING TUBE IN RESIDENTIAL CARE FACILITIES FOR INDIVIDUALS WITH INTELLECTUAL DISABILITY: A FOCUS GROUP STUDY ON GUIDELINE IMPLEMENTATION</u> | <u>79</u> |
| INTRODUCTION | 81 |
| METHODS | 82 |
| Study design and participant recruitment | 82 |
| Data collection | 83 |
| Data analysis | 85 |

| | |
|---|------------|
| RESULTS | 85 |
| Time constraints | 86 |
| Knowledge of guidelines & clear administration instructions | 86 |
| Habits | 87 |
| Lack of necessary material & practical issues | 88 |
| Limited gastric fluid tolerance of some residents | 88 |
| Comfort & safety of the resident | 88 |
| DISCUSSION | 89 |
| CONCLUSION | 91 |
| | |
| <u>CHAPTER 6: KNOWLEDGE OF STAFF MEMBERS OF RESIDENTIAL CARE FACILITIES FOR INDIVIDUALS WITH INTELLECTUAL DISABILITY ON MEDICATION ADMINISTRATION VIA ENTERAL FEEDING TUBE</u> | |
| | |
| INTRODUCTION | 97 |
| METHODS | 97 |
| Study design & participants | 97 |
| Questionnaire | 98 |
| Data collection | 98 |
| Data analysis | 98 |
| RESULTS | 101 |
| Participants | 101 |
| Total questionnaire score | 101 |
| Individual questions | 102 |
| DISCUSSION | 102 |
| CONCLUSION | 104 |
| | |
| <u>CHAPTER 7: MEDICATION ADMINISTRATION VIA ENTERAL FEEDING TUBE: A SURVEY OF PHARMACISTS' KNOWLEDGE</u> | |
| | |
| INTRODUCTION | 109 |
| METHODS | 109 |
| Study design and participants | 109 |
| Data collection | 109 |
| Data analysis | 112 |
| RESULTS | 112 |
| DISCUSSION | 114 |
| Main findings | 114 |
| Interpretation of findings in relation to previous studies | 114 |
| Limitations | 115 |
| CONCLUSION | 115 |
| | |
| <u>CHAPTER 8: GENERAL DISCUSSION</u> | |
| | |
| MAIN FINDINGS | 119 |
| IMPLICATIONS FOR PRACTICE | 121 |
| FUTURE RESEARCH OPPORTUNITIES | 125 |

| | |
|---|------------|
| SUMMARY | 129 |
| SAMENVATTING | 135 |
| APPENDICES | 141 |
| APPENDIX 1: QUESTIONNAIRE ON THE MEDICATION MANAGEMENT PROCESS | 143 |
| APPENDIX 2: FOCUS GROUP VIGNETTES | 175 |
| APPENDIX 3: ADVICES TOWARDS DIRECTION, MEDICAL OFFICE STAFF, AND DELIVERING PHARMACIST | 181 |
| APPENDIX 4: EDUCATIONAL SESSION | 195 |
| APPENDIX 5: FLOWCHART MEDICATION ADMINISTRATION THROUGH EFT | 219 |
| APPENDIX 6: OVERVIEW OF DRUGS FOR WHICH A PROLONGED BREAK IN ENTERAL FEEDING IS RECOMMENDED | 223 |
| CURRICULUM VITAE | 243 |

LIST OF ABBREVIATIONS

| | |
|------------|---|
| ADHD | attention deficit hyperactivity disorder |
| ANOVA | analysis of variance |
| ASHP | American Society of Health-System Pharmacists |
| A.S.P.E.N. | American Society for Parenteral and Enteral Nutrition |
| ATC | anatomical therapeutic chemical (classification system) |
| Ch | Charrière |
| CPOE | computerized physician order entry |
| CDSS | clinical decision support systems |
| DDI | drug-drug interaction |
| EFT | enteral feeding tube |
| Fr | French |
| ICU | intensive care unit |
| ID | intellectual disability |
| IQ | intelligence quotient |
| JCAHO | Joint Commission on Accreditation of Healthcare Organizations |
| MMP | medication management process |
| MR | medical record |
| PEG | percutaneous endoscopic gastrostomy |
| PPI | proton pump inhibitor |
| RCF | residential care facility |
| SOP | standard operating procedure |
| SD | standard deviation |
| VAPH | Vlaams Agentschap voor Personen met een Handicap |
| WHO | World Health Organization |

Chapter 1: GENERAL INTRODUCTION

1. INTELLECTUAL DISABILITY

1.1. Definition & classification

Intellectual disability (ID), formerly known as “mental retardation”, is a state of functioning that most often appears in early childhood and is characterized by limitations in intelligence and adaptive skills. Several definitions of intellectual disability (ID) have been issued ¹⁻³. These definitions can be summarized as follows:

Intellectual disability is a condition characterized by significant limitations in both intellectual functioning and adaptive behaviour, with onset during the developmental period ^{1,3} (or before 18 years of age ²).

Limitations in *intellectual functioning* can be described as limitations in general mental capacity (intelligence) including learning, reasoning, and problem solving, abstract thinking, and judgment. Intellectual functioning is measured using standardized intelligence tests ¹. Limitations in *adaptive behaviour* can be defined as limitations in adaptive functioning that result in failure to meet developmental and sociocultural standards for personal independence and social responsibility, and affect participation in multiple environments, such as home, community, and school. Adaptive deficits include limitations in at least one of three domains: conceptual (i.e. communication), social (i.e. social participation), and practical (i.e. independent living). Without ongoing support, the adaptive deficits limit functioning in one or more activities of daily life ¹.

Although both intellectual and adaptive impairment measures are pertinent in describing ID, the impairments in adaptive functioning are usually the presenting symptoms of ID, rather than a low intelligence quotient (IQ) ⁴. IQ test scores are approximations of conceptual functioning, but may be insufficient to assess reasoning in real-life situations and mastery of practical tasks ^{1,4}. It is adaptive functioning that determines the level of support required. Moreover, IQ measures have shown to be less valid in the lower end of the IQ range. Therefore, the use of full-scale IQ score and IQ cut-off points to define ID-severity has shifted to the use of an approach based on the degree of impairment in adaptive functioning ^{1,5 a}.

According to the older approach classifying severity of ID by using IQ, an IQ test score below or around 70 indicated a limitation in intellectual functioning. The following categories were used ⁶:

- Mild ID: IQ between 50 to 55 and 70
- Moderate ID: IQ between 35 to 40 and 50 to 55

^a This represents a change in the latest version of the Diagnostic and Statistical Manual (DSM-5) ¹ as compared with the DSM-IV ⁶, and is now similar to the definition used by the American Association on Intellectual and Developmental Disabilities (AAIDD) ².

- Severe ID: IQ between 20 to 25 and 35 to 40
- Profound ID: IQ less than 20 to 25

In the newer approach defining severity of ID according to the level of support needed in each of the adaptive functioning domains, the same four levels are used: mild, moderate, severe and profound ¹ (or the four similarly named levels focusing on the support needs: intermittent, limited, extensive and pervasive ²). Table 1 details the impairments in the adaptive functioning domains for the different severity levels.

Table 1 Classification levels of ID according to the level of support needed in each of the adaptive functioning domains ⁴ (“new approach” of ID classification)

| Severity level ID * | Adaptive skill domains | | |
|---------------------|---|--|--|
| | Conceptual domain [§] | Social domain [§] | Practical domain [§] |
| <i>Mild</i> | Children require academic supports to learn skills expected for age. Adults may have difficulties with functional academic skills such as planning, reading, and money management. | Social skills and personal judgement are immature for age. The individual is at risk of being manipulated by others (gullibility). | Most individuals are independent in daily living activities, employable in jobs requiring simple skills, and often able to live independently. They typically need support for making decisions in health care, nutrition, shopping, finances, and raising a family. |
| <i>Moderate</i> | For children, conceptual and academic skills lag well behind those of peers. For adults, academic skills are typically at an elementary level. Complex tasks such as money management need substantial support. | Successful friendships with family/friends are possible using spoken language, but the individual is limited by deficits in social and communicative skills. Social cues, social judgment, social and life decisions regularly need support. | Most individuals are capable of personal care activities with sufficient teaching and support, and achieve independent self-care with moderate supports, such as available in a group home. Adults may be employable in a supported environment. |
| <i>Severe</i> | Individuals have little understanding of written language, or number, time, and money concepts. Caretakers provide extensive supports for problem-solving. | Individuals benefit from healthy supportive interactions with family/familiar people and may use very basic single words, phrases, or gestures pertinent to their direct experience. | Individuals are trainable in some basic activities of daily living with significant ongoing support and supervision. |
| <i>Profound</i> | Individuals may use objects in a goal-directed fashion for self-care and recreation. | Although understanding of symbolic communication is very limited, individuals may understand some gestures and emotional cues, and can express themselves non-verbally. | Individuals are typically dependent upon support for all activities of everyday living. Co-occurring sensory or physical limitations are common. |

N.B.: Under the age of 5 years, the clinical severity level cannot be reliably assessed (called “Global Developmental Delay”). This category requires reassessment after a period of time. ¹

* DSM-V-defined categories of severity

[§] Examples of the needs and supports of each adaptive domain, with increasing categories of severity

1.2. Epidemiology

Prevalence

Different prevalence rates have been reported, depending on definitions and classifications used, methods of ascertainment, and population studied ^{6;7}. In the general population, the prevalence of ID is approximately 1% ^{1;8;9}. Prevalence varies by age ^{1;8} (prevalence was higher in studies based on children/adolescents compared to studies in adults ⁸), gender (prevalence higher in male populations) ¹, and income of the country of origin (highest rates were seen in countries from low- and middle income) ⁸. Among those with ID, mild, moderate, severe and profound ID (as measured by IQ) affects about 85%, 10%, 4%, and 2% of the population respectively ⁶, whereas others report that about two-thirds of those with ID are within the mild range of severity ^{9;10}.

Belgium and Flanders follow the trends of most industrialised countries regarding prevalence of ID. All the available statistics on prevalence in Belgium are delivered by the organisations in the care system: so, one reliable overview is not available. For example, someone can be registered during his school career, leave the statistics when becoming an adult, and finally re-enter as a ‘new client’ a couple of years later through the Flemish Agency for People with a Disability (Vlaams Agentschap voor Personen met een Handicap, VAPH) on the basis of a demand for support ¹⁰.

Risk factors

Genetic and biological factors are implicated in many cases of ID. In previous studies an increased risk for *severe ID* was seen in males ^{1;11}, low-birth-weight infants (e.g. premature infants), and children of Hispanic, Black, or Asian mothers (compared with White mothers) ¹¹. It also appeared to be associated with higher maternal age and decreasing maternal education ^{11;12}.

The risk factors for *mild ID* were slightly different. An increased risk was identified in multiple births and children born second or later ¹¹. Compared with children born to White mothers, the risk of having a child with mild ID appeared to be higher for Black mothers, lower for Asian mothers, and similar for Hispanic mothers ¹¹. Other reported risk factors were a low level of maternal education, higher maternal age, and low birth weight, and a slightly increased risk was seen in children born to mothers 15 to 19 years old ¹². Advanced paternal age (>40 years) on the other hand appeared to be a risk factor for *mild to moderate ID* ¹³.

1.3. Etiology

There are multiple factors that may contribute to ID. Causes may be congenital or acquired with a prenatal, perinatal or postnatal timing of acquisition. Both genetic and physiological factors can play a

role in it. At present, it appears that between a quarter to one-half of identified causes are genetic in origin.¹⁴

Genetic causes

Genetic conditions are increasingly being diagnosed by technological advances in genetic testing. Some of the known genetic disorders or conditions causing ID include the following^{9;15}:

- Chromosomal abnormalities (e.g. trisomy 21 or down syndrome)
- Single-gene disorders, such as X-linked disorders (e.g. fragile X syndrome, Rett syndrome)
- Autosomal dominant disorders (e.g. neuro-fibromatosis)
- Autosomal recessive disorders, include many inborn errors of metabolism (e.g. MSUD)
- Mitochondrial disorders

Environmental causes

Prenatal - Prenatal non-genetic causes of ID include intrauterine malnutrition, infections (e.g. cytomegalovirus), and other environmental influences such as alcohol, other drugs, toxins and teratogens (e.g. lead, mercury, phenytoin, valproate)^{1;9;15}.

Perinatal - A variety of labour and delivery-related events (e.g. birth asphyxia, preterm birth), and infections (e.g. herpes virus) may lead to ID^{1;9;15}.

Postnatal - Postnatal causes include hypoxic ischemic injury, trauma, central nervous system haemorrhages and malignancies, infections, seizure disorders (e.g. infantile spasms), severe and chronic social deprivation, malnutrition, and toxic metabolic syndromes and intoxications (e.g. lead, mercury)^{1;9;15}.

1.4. Clinical features

1.4.1. Presenting symptoms

Children with ID usually are brought to the attention of a paediatrician because of parental concerns of language delay, immature behaviour, immature self-help skills, or difficulty in learning. Parents may first recognize delayed development when a younger sibling overtakes an older child in these skills. In other cases, the clinician may be alerted to the possibility of ID when a child fails to meet expected developmental milestones during developmental surveillance and screening⁴.

Onset of ID is in the developmental period. The age and characteristic features at onset depend on the etiology and severity of brain dysfunction. Delayed motor, language, and social milestones may be identifiable within the first 2 years of life among those with more severe ID, while mild levels may not

be identifiable until school age when difficulty with academic learning becomes apparent. When ID is associated with a genetic syndrome, there may be a characteristic physical appearance (e.g. Down syndrome). Some syndromes have a behavioural phenotype, which refers to specific behaviours that are characteristic of particular genetic disorder (e.g. Lesch-Nyhan syndrome). In acquired forms, the onset may be abrupt following an illness such as meningitis or encephalitis or head trauma occurring during the developmental period. After early childhood the disorder is generally lifelong, although severity levels may change over time. The course may be influenced by underlying medical or genetic conditions and co-occurring conditions (e.g. epilepsy)¹.

1.4.2. Associated conditions

A common feature for all manifestations of ID is that mental, neurodevelopmental, medical, sensorial, and physical conditions frequently co-occur. The rates of some health conditions are much higher than in the general population ^{1;16;17}. For example epilepsy ^{1;17-19}, mental disorders ^{1;17;19}, cerebral palsy ^{1;17}, sensory loss ¹⁸, and an (increased risk of) fractures ^{18;19} are found to be more prevalent compared to people without ID. Feeding problems are also highly prevalent among individuals with ID ²⁰. In addition, *Jauhari et al.* found that prevalence of comorbidities increased with severity of ID, except for ADHD, autism, and violent behaviour, for which prevalence in people with ID decreased with severity ²¹.

The most common co-occurring *mental and neurodevelopmental disorders* are attention-deficit/hyperactivity disorder, depressive and bipolar disorders, anxiety disorders, autism spectrum disorder, stereotypic movement disorder (with or without self-injurious behaviour), impulse-control disorders, and major neurocognitive disorder. Major depressive disorder may occur throughout the range of severity of ID. Individuals with ID, particularly those with more severe ID, may also exhibit aggression and disruptive behaviours, including harm of others or property destruction ¹.

Medical conditions commonly associated with ID include seizure disorders, motor impairment affecting gross, fine, and speech motor functions, structural abnormalities, dysmorphism, vision, hearing, and other sensory impairments ⁴, and gastrointestinal motility problems such as constipation ²²⁻²⁴. In some cases, these other morbidities are the presenting features, while in others they may be unrecognized. Comorbid endocrine abnormalities may also be present such as abnormal thyroid function, short stature, and growth hormone deficiency ⁴.

Feeding problems are found to be common across all ID levels. Certain categories of problems such as eating/feeding skills (including motor skills, muscle tone, motor coordination, etc.) and aspiration risk, are more prevalent among individuals with severe/profound ID, while the children in the moderate and mild groups show other eating/feeding problems ²⁰. To ensure adequate nutritional intake in

individuals who are unable to take nutrients through the oral route totally or in part (but with functional gastrointestinal tract), they often depend on an enteral feeding tube (EFT) ^{25;26}.

1.5. Management

The overall goals of the management of ID are to strengthen areas of reduced function, provide ongoing support, prevent or minimize further deterioration in the child's cognitive-adaptive function relative to peers, and promote optimal individual functioning in society. Interventions should begin early and be sustained. Goals should be appropriate and achievable. The approach should be collaborative and multidisciplinary ²⁷.

1.5.1. General measures

Children with ID require ongoing health surveillance. The multidisciplinary team should monitor developmental, academic, and psychosocial progress, explain functional profiles to the family, and advise regarding appropriate supports. The clinicians should also consider other developmental deficits, neurodevelopmental disorders, and coexisting conditions that impact functioning ²⁷.

Most individuals with ID require a broad range of interventions that should be applied early to improve short-term and long-term outcomes, including ²⁷:

- Speech and language therapy
- Occupational therapy
- Physical therapy and rehabilitation, including mobility and postural support
- Family counselling and support
- Behavioural intervention
- Educational assistance
- Pharmacological treatment

1.5.2. Care facilities

1.5.2.1. European and Belgian setting

Europe

In Europe, there is a determined movement toward deinstitutionalization of people with ID. However, the stage and the policies related to this process vary from country to country and show a heterogeneous picture. In Belgium, the Netherlands, Germany, Spain, Greece, Italy, and Portugal, there is still a varying pattern of institutional care. Even though the number of people in large residential institutions is decreasing in these countries, institutional care is still dominant compared with the UK (where the process of deinstitutionalization is well advanced) and countries such as

Sweden and Norway (where residential institutions for people with ID have closed and no one with ID lives in institutional settings anymore)^{28;29}. However, a review of the international literature suggested that healthcare needs might not be met as satisfactorily in the community as in institutions³⁰.

Belgium – Flanders

People with ID have very differing needs for which various support and guidance options for both children and adults are available. In Flanders the following facilities are available^{10;31}:

- *Home services* provide help for people in their homes. For example, these services can involve giving a few hours of lessons to a disabled person at home. They can also provide them with help in their everyday activities.
- *Semi-residential services* take care of people with ID in the day-time, but they stay at home with their family in the evenings, nights and weekends.
 - Children: semi-boarding schools. Most of the semi-boarding schools are linked to special schools. They take care of children and youngsters with labels such as ID.
 - Adults: day centre. Those centres give support on several domains, but their specific expertise is situated in the domain of adapted activities for adults who cannot work on the regular labour market.
- *Residential care facilities (RCF)* take care of people that cannot be cared for at home. In these facilities support and care are provided 24 hours a day, 7 days a week.
 - Children: boarding houses offer support and care for children whether they attend school or not. Most of these initiatives are also linked to special schools.
 - Adults: are offered support in a wide variation of residential services:
 - Homes for working people are designed to enable people with a disability to go to work during the day, but to satisfy their care needs in the evenings and over the weekends. Such a home offers personal support rather than care.
 - Homes for non-working people offer care and support for severely disabled people. They provide a home situation and meaningful daytime activities (“occupation”), and/or medical, psychological and social services for people with an intensive need of support (“nursing”).

RCFs are run by private not for profit organizations, and get their subsidies from the Flemish Agency for People with a Disability (“Vlaams Agentschap voor Personen met een Handicap”) that falls within the authority of the Flemish governmental agency for welfare.

A typical RCF in Flanders consists of several units and a medical office, managed by the RCF’s director and board. A unit is a living group of approximately 10 residents, where daily care and support is

provided by educators (i.e. bachelor degree in orthopaedagogics) and/or caretakers and/or nurses. The medical office is a physical location within the RCF where all medical records are centralized, and where the practical aspects of the medication management process such as ordering, storage, distribution of medication are generally coordinated. The medical office is staffed by nurses and/or physicians, physiotherapists, or other health care professionals.

1.5.2.2. Medication management

To ensure drug safety, all stages of the medication use process – selection, prescribing, ordering, storage, dispensing, administration and monitoring – must be appropriately integrated into a comprehensive medication management process (MMP). Such a system encompasses standard procedures for medication handling in the health care facilities (e.g. safe and appropriate drug storage, and correct drug administration) ³².

2. MANAGING & ADMINISTERING MEDICATION IN RCFs FOR INDIVIDUALS WITH ID

2.1. Challenges

2.1.1. Polypharmacy

Given the high prevalence of comorbid conditions, individuals with ID are likely to be prescribed a variety of medicines and experience high medication intake ³³.

Prevalence & consequences

The prevalence of polypharmacy among people with ID varies considerably, ranging from 11% to 60% due to the variability in methods used to study polypharmacy (e.g. definitions of polypharmacy) and study-population used ³⁴. A recent population-based survey in Australia reported that more than three out of four (76.5%) people with ID had used medication in the last two weeks ³⁵. The number of medicines used by people with ID ranged from 1 to 19 medicines, with a mean number of 3.3 (95% CI, 3.1–3.6) medicines in use per participant. In this survey, prevalence of polypharmacy (defined as concurrent use of five or more drugs) increased with severity of ID from about 16.2% in mild ID to 39.2% in profound ID ³⁵.

Although sometimes inevitable, polypharmacy is associated with an increased risk of medication nonadherence, adverse drug reactions, and undesirable drug-drug interactions. It may also increase the risk for medication errors, as has been demonstrated in the elderly population ³⁶. Additionally,

individuals with ID are more at risk for medication errors because of the fact that they may not be aware of errors because of their cognitive impairment ³⁷.

Medication used by individuals with ID

Little is known about the overall medication use in individuals with ID. One study investigated the chronic drug utilisation (defined as drug treatments for conditions present for at least 3 months) in children with ID aged 4–18 years ³⁸. Majority (51%) of the 912 participants were classified as having mild ID. About 22% used chronic medication. The most commonly used drug groups were for the nervous system (used by 17% of the study population), the respiratory system (4%), and the alimentary tract (3%). Psychotropic medication, defined as all nervous system drugs except for the antiepileptics, was used by 10% of the children. The prevalence of drug use increased with severity of ID from about 17% to 49%.

Another study described medication use among Australian adults with ID (living in the community) in primary healthcare settings ³⁹. Of the 117 participants in this study, 35% were prescribed psychotropic medications, most commonly antipsychotics, and 26% anticonvulsants. Complementary medications (vitamins, minerals, amino acids, fish oil, and herbal products) were used by 29% of participants. Other studies on medication use in people with ID focused mainly on psychotropic drugs ^{40;41}.

The currently available medication use studies demonstrate that people with ID use a broad range of medications, with psychotropic medications as the most predominant agents.

2.1.2. Patients with enteral feeding tube

Since many individuals with severe and profound ID experience feeding problems, especially those with concomitant motor function problems, both food and medication are often administered through EFT. However, due to the complexity of medication administration through EFT, this route is prone to errors. To reduce these risks, guideline recommendations for the safe administration of medication through EFT have been issued ^{25;26}.

2.1.2.1. Types of enteral feeding tubes

Various EFTs are available for delivering nutrition and medication to the patient. The feeding tubes are typically classified by site of insertion (e.g. nasal, oral, percutaneous) and location of the distal tip of the feeding tube (e.g. stomach, duodenum, jejunum) (Figure 1). The choice of enteral access route depends on the intended duration of feeding, whether the gastric function is normal, and the patient's concurrent diseases ²⁶. For patients who require short-term enteral nutrition, nasogastric tubes (e.g. nasogastric, nasoduodenal or nasojejunal tubes) are commonly used because they are easier to place

and less costly than other enteral access routes. These feeding tubes may be inserted nasally, with the distal end of the tube in the stomach or in the small intestine. An orogastric tube is an alternative less comfortable option for short-term feeding, particularly when a tube cannot be placed nasally. Patients who require long-term enteral nutrition (i.e. > 4 to 6 weeks) should be considered for gastrostomy or jejunostomy tube placement ^{26;42}. A percutaneous endoscopic gastrostomy (PEG) tube is one of the most widely used feeding enterostomies ⁴².

The external diameter of the feeding tube is expressed using the French (Fr) or Charrière (Ch) unit, where each 'French' or 'Charrière' is equivalent to 0.33 mm ²⁶. Small-bore nasoenteric tubes improve patient comfort, but they are prone to clogging and become displaced easily ⁴².

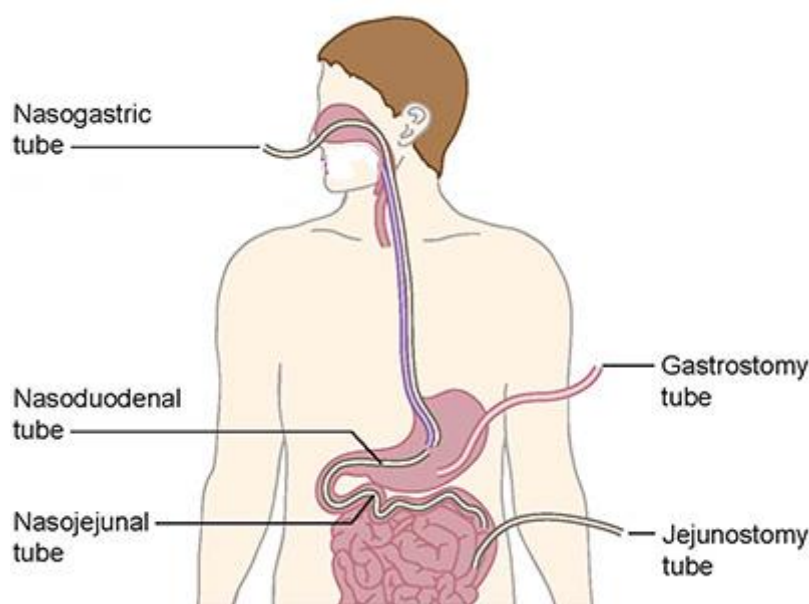


Figure 1 Locations of various types of enteral feeding tubes. Nasoduodenal, nasojejunal, and jejunostomy tubes extend to the small intestine instead of ending in the stomach. ⁴³

2.1.2.2. Drug administration through EFT

Practice recommendations for administering medication through an EFT have been available for many years. The American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.) developed evidence-based guidelines for safe medication administration ²⁵, and White and Bradnam compiled a Handbook of Drug Administration via Enteral Feeding Tubes ²⁶.

Note: Administration of drugs via EFT will generally be outside of the marketing authorisation as manufacturers do not tend to test or license drugs to be administered via this route. When a drug is administered outside of the terms of its product license (e.g. crushing tablet or opening capsule), the manufacturer is no longer responsible for any adverse event or treatment failure. This has implications for the professionals responsible for prescribing, supplying and administering the drug, as they become liable for any adverse event that the patient may experience ²⁶.

Guideline recommendations for medication preparation

The guideline recommendations found in literature concerning medication preparation for administration through EFT, are discussed below.

Select the most suitable formulation ²⁶

When deciding which dosage form is appropriate for administration via EFT, many factors need to be taken into consideration. It is not necessarily correct to assume that a liquid is preferable to a tablet; unwanted side-effects of the excipients of a liquid dosage form must be borne in mind ²⁶. Liquid dosage forms usually contain excipients (such as thickeners, stabilizers, suspension agents, and sweeteners) that increase the liquid's viscosity and osmolarity, respectively affecting how the mixture flows through the EFT and causing gastrointestinal intolerance and diarrhoea ⁴⁴. In Table 2 the advantages and disadvantages of the different dosage forms are shown.

In conclusion, (i) solutions or soluble tablets are the formulations of choice, (ii) however, do not assume that liquid formulations are always suitable, and (iii) do not crush tablets or open capsules unless an alternative formulation or drug is unavailable ²⁶.

Do not crush sustained release dosage forms ^{25;26}

Sustained release tablets are formulated to release the drug slowly over time. Crushing sustained-release dosage forms destroys this carefully designed form, hence affecting the pharmacokinetic profile of the drug since an excessive dose of the drug is being released at one time. This potentially results in drug toxicity ^{25;26;44}. Instead, a more appropriate dosage form or therapeutic equivalent should be considered ²⁵.

Do not crush enteric coated dosage forms in case of gastrostomy ²⁶

Tablets are given an enteric coating to protect the drug from degradation by the acidic conditions of the stomach or to reduce the incidence of gastric side-effects ²⁶. Administering this dosage form via EFT would necessitate crushing, thereby destroying the enteric coating. However, enteric coated tablets do not crush well and tend to aggregate in clumps when diluted in water, thereby increasing the risk of clogging ^{25;26;44}. Moreover, suitability of this dosage form depends on the location of the distal end of the EFT ²⁶:

Table 2 Overview different dosage forms and their advantages and disadvantages concerning administration through enteral feeding tube ²⁶

| DOSAGE FORM | ADVANTAGES | DISADVANTAGES |
|------------------------------|---|--|
| Solution | <ul style="list-style-type: none"> • Even drug distribution allows accurate dosing • Ready to use • Easy to measure • Accurate dosing • Suitable for administration via an enteral feeding tube without further manipulation | <ul style="list-style-type: none"> • Co-solvents may be present in sufficient quantities to have a pharmacological effect, especially if present in all drug formulations being used; for example, sorbitol (≥ 15 g/day) will have a laxative effect. • May not be considered practical for carrying around • Cost • Stability and a short shelf-life may be impractical |
| Suspension | <ul style="list-style-type: none"> • Ready to use (few exceptions) • Easy to measure • Accurate dosing | <ul style="list-style-type: none"> • Granules in suspension may be too large or the suspension may be too viscous to pass through the enteral feeding tube • Settling or inadequate shaking may affect the accuracy of dosing • May not be practical to carry around • Cost • Stability and shelf-life may be impractical |
| Soluble tablet | <ul style="list-style-type: none"> • Drug is in solution • Long expiry date of original packaged drug • Usually less expensive than alternative liquid formulation • Easy to carry around • Accurate dosing | <ul style="list-style-type: none"> • One must allow complete dissolution before administration |
| Effervescent tablet | <ul style="list-style-type: none"> • Low osmolarity: will not cause diarrhoea • Long shelf-life of original packaged drug • Easy to carry around and convenient • Generally less expensive than liquids • Accurate dosing | <ul style="list-style-type: none"> • May require a large volume to be fully dispersed • Must be fully dispersed before administration to avoid gas production in the enteral feeding tube • Sodium content can be high • Excipients may not dissolve and may sediment out • Cannot be dispersed in syringe owing to the production of gas |
| Dispersible tablet | <ul style="list-style-type: none"> • Cost • Convenient to carry around • Lower electrolyte content than effervescent tablets | <ul style="list-style-type: none"> • Particles/granules of dispersion may be too large for administration via fine-bore tubes • Sedimentation during administration may lead to tube blockage |
| Orodispersible tablet | <ul style="list-style-type: none"> • Convenient to carry around • Cost | <p>Individual monographs should be consulted, because:</p> <ul style="list-style-type: none"> • Some formulations are unsuitable for fine-bore tubes owing to site of absorption or formulation characteristics • The dose may be inappropriate (lower dose than the equivalent oral product) |

| | | |
|----------------------------------|---|---|
| Buccal/sublingual tablets | Not suitable for administration via enteral feeding tubes as significantly reduced drug absorption will occur, owing to first-pass metabolism. | |
| Compressed tablets | <ul style="list-style-type: none"> • Cheap • Easily obtained • Most disintegrate easily when placed in water • Tablets that disintegrate: no need to crush, therefore exposure risk is reduced | <ul style="list-style-type: none"> • Not all tablets will disintegrate easily → tablets that do not disintegrate, should be crushed • Variability in dispersion characteristics between generic brands of the same drug • Administration method can affect dosing accuracy |
| Enteric-coated tablets | If the patient has a feeding tube with the end in the small intestine (duodenum or jejunum), then crushing or removing the enteric coat prior to administration down the enteral feeding tube is not an issue. | Administration of this form with the tip placed in the stomach would necessitate crushing or removing the enteric coat prior to administration; therefore, the drug is likely to be degraded in the stomach. The extent of drug degradation is unpredictable and the practitioner should explore alternative therapies or routes before deciding to administer enteric-coated tablets via an enteral feeding tube placed in the stomach. If it is decided to administer this dosage form, it will result in decreased amounts of drug available for absorption and the patient's response to therapy should be monitored carefully. |
| Modified-release tablets | Not suitable for administration via enteral feeding tubes because altering the dosage form will affect the pharmacokinetic profile of the drug and may result in excessive peak plasma concentrations and side-effects | |
| Hard gelatin capsules | <ul style="list-style-type: none"> • Cheap • Convenient | <ul style="list-style-type: none"> • Occupational exposure risk • Small capsules may be difficult to open • Not all capsules are suitable; the contents may not disperse in water owing to the hydrophobic nature of the powder |
| Soft gelatin capsules | <p>Drugs that are presented in soft gelatin capsules are usually poorly soluble in water and are therefore contained in an oily solution within the capsule. Therefore, it is unlikely that these will be suitable for administration via an enteral feeding tube.</p> <p>In certain circumstances it may be possible to pierce the capsule shell using a pin and squeeze out the contents; however, accurate dosing cannot be guaranteed. The volume contained in the capsule can vary depending on the brand of capsule used, and the volume expelled will vary depending on the skill of the person expelling the contents; for these reasons this method is unreliable and is not recommended.</p> | |

- When the tip of the EFT is placed *in the stomach*, destruction of the enteric coating may result in degradation of the drug in the stomach or in gastric side effects. The extent of drug degradation and its effect on bioavailability – and hence patient’s response to therapy – is unpredictable.
- If the patient has an EFT with the tip *in the small intestine* (duodenum or jejunum), crushing or removing the enteric coat prior to administration down the enteral feeding tube is not an issue.

Avoid mixing together medications ²⁵ & Do not crush tablets together ⁴⁴

The risk for drug–drug interactions (and for interactions involving excipients) increases when two or more *dosage forms* are *crushed* together. The chemical interaction between two or more drug substances within the confined space of a mortar under a pestle or other tablet crushing device may be much greater than the interaction that would occur when two drug dosage forms are swallowed simultaneously. When crushing drugs together, significant force is applied, resulting in an increased amount of particulate surface area available for interaction. This might theoretically accelerate changes in molecular structure and formation of complexes, with subsequent changes in physical and chemical properties. Any new dosage form created by crushing and mixing together two or more dosage forms should still release each drug in a known and consistent manner following administration. Unfortunately this information is not available and therefore crushing tablets together cannot be recommended ^{25;44}.

Similar concerns pertain to mixing two or more *liquid dosage forms*. When combining liquid drug formulations, knowledge of each solvent’s physicochemical properties will be required to minimize disruption of drug solubility and stability. Therefore, combining one liquid drug product with another can be quite complex, altering the solubility of products with each new additive in the mix ²⁵. Because data on stability and compatibility of such mixtures are not readily available, every new mixture should be studied before predictions can be made ^{25;44}. Furthermore, mixing one liquid drug product with another may alter viscosity and affect how the mixture flows through the EFT ⁴⁴.

Mixing (and crushing) together medications intended for administration through EFT should be avoided, given the risks for physical and chemical incompatibilities, tube obstruction, and altered therapeutic drug responses ²⁵. Thus, when more than one drug is scheduled for administration, they should preferably be given separately ^{25;44}.

Shake suspensions and emulsions thoroughly before use ^{25;26}

Suspensions are heterogeneous liquids containing a poorly soluble active medication floating in a liquid medium that contains suspending or thickening agents. Disadvantages of suspensions include their viscosity and the potential for settling out of dispersed particles ²⁵. An emulsion is a dosage form consisting of a two-phase system comprised of at least two immiscible liquids, one of which is dispersed as droplets (internal or dispersed phase) within the other liquid (external or continuous phase), generally stabilized with one or more emulsifying agents ⁴⁵.

To ensure correct dosing, suspensions and emulsions should be shaken well immediately prior to drug administration ²⁵. Not shaking suspensions/emulsions leads to a high variability in the doses administered, and consequently to underdosing and therapeutic failure on one occasion, and overdosing and potential toxicity on another. This was demonstrated by an experimental study of the consequences of not shaking an amoxicillin suspension, which revealed manifest dosing errors (e.g. doses < 10% of the labelled content) ⁴⁶.

Open hard gelatin capsules (if allowed) and mix contents with water ^{25;26}

Hard gelatin capsules should be opened (if allowed) and the contents mixed with water ^{25;26}. Contents of an appropriate hard gelatin capsule should be crushed/pulverized to a fine powder before being dispersed (if necessary and if allowed), dissolved, or suspended in an appropriate volume of water ²⁵. Even though studies did not describe the reasons for opening and emptying hard gelatin capsules (hence avoiding administration of the gelatin capsule), it seems logical to do so because of the possibility of undissolved gelatin causing tube obstruction. On the other hand, caution should be taken when emptying the capsule ensuring the capsule's contents are removed entirely.

N.B.: Soft gelatin capsules are best avoided in enterally fed patients: interfering with the integrity of these capsules poses another level of complexity as it is difficult to assure accurate doses ^{25;26} (see Table 1).

Dilute solid medication with at least 10mL of water ⁴⁸

In this guideline 'dilution' refers to the dispersion or dissolution of solid medications. To be able to administer solid dosage forms through EFT, they should be dispersed or dissolved as appropriate ²⁵ (thus converting the solid medication into a liquid form), i.e. in at least 10mL of water ^{26;47}. A lower volume of water should be used for paediatric doses, at least 5 mL when fluid is not restricted ²⁵.

As the A.S.P.E.N. guidelines ²⁵ and the Handbook of Drug Administration via Enteral Feeding Tubes ²⁶, which we use as guideline standards, do not provide a concrete advice concerning the dilution of medication before administration through the EFT, a literature review on this topic was undertaken

that identified several extra recommendations. All recommendations agree on the necessity of diluting^{25;26;44;47-49}, but there seems to be inconsistency regarding the amount of liquid used (see Table 3). For dilution of solid medication, we chose ‘dilute with at least 10mL’ as the minimal, concrete advice.

Table 3 Recommendations regarding dilution of solid/liquid medication according to different information sources

| <i>Literature source</i> | <i>Solid medication</i> | <i>Liquid medication</i> |
|--|---|--|
| <i>A.S.P.E.N. Enteral Nutrition Practice Recommendations (Bankhead et al., 2009)</i> ²⁵ | Dilute as appropriate | Dilute as appropriate |
| <i>Handbook of Drug Administration via Enteral Feeding Tubes</i> ²⁶ | Compressed, dispersible & soluble tablet: 10mL Effervescent tablet: suitable quantity Capsule: 15mL | Suspension: Equal volume of water |
| <i>Boullata (2009)</i> ⁴⁴ | Dilute (amount not mentioned) | Dilute as appropriate: the higher the product’s viscosity or osmolality, the more diluted it should be before administration |
| <i>BAPEN (flowchart)</i> ⁴⁷ | 10-15mL | Equal amount |
| <i>American Society of Consultant Pharmacists (2013)</i> ⁴⁸ | 15mL | 10-30mL |
| <i>Williams, 2008</i> ⁵⁰ | Crushed tablet: 15-30mL Capsule->powder: 10-15mL | Hyperosmolar liquid medication: 10-30mL |
| <i>Wohlt et al., 2009</i> ⁴⁹ | 30mL | At least 30mL |

Dilute liquid medication with at least an equal amount of water⁴⁷

Liquid dosage forms often must be further diluted with water prior to administration through EFT depending on their viscosity and osmolality, thereby improving flow through the EFT or reducing gastrointestinal intolerance^{25;44}. The higher a drug product’s viscosity or osmolality, the more diluted it should be before administration through the EFT⁴⁴.

High *viscous* liquids show resistance to flow easily through an EFT. Suspensions for example, tend to have much higher viscosity than solutions. This resistance can be reduced through dilution (but this still may not be adequate to overcome a narrow tube)²⁵. Dilution of each liquid medication prior to administration is associated with improved delivery of the drug dose to the distal end of the tube^{51;52}. Another argument for diluting liquid medication formulations may be to reduce *osmolality*. The higher the osmolality of a drug product, especially when administered directly into the small intestine, the more likely that gastrointestinal intolerance and diarrhoea occur²⁵. However, the likelihood for osmolality-increasing excipients (e.g. poorly-absorbed sweeteners and stabilizers) or electrolytes to cause clinically relevant side-effects, seems low. For example for the excipient sorbitol, a laxative effect has been seen in doses exceeding 15 g/day²⁶.

The volume of diluent required will be determined by the viscosity and osmolarity of the liquid dosage form, the length of the feeding tube, its internal diameter, and the location of the distal tip ^{25;44}. The recommendations for dilution of liquid medication vary from ‘dilute as appropriate’ ^{25;44}, over ‘dilute with an equal amount’ ⁴⁷ or ‘with 10-30mL’ ⁴⁸, to ‘dilute with at least with 30mL’ ⁴⁹ (see Table 3). Therefore, we decided to select the minimal, concrete advice available in these guidelines as guideline standard, i.e. ‘dilute with an equal amount’.

However, when diluting (or dispersing/dissolving) solid as well as liquid medications for a patient on restricted fluid intake (such as one with heart failure or kidney disease), the smallest possible amount of diluent should be used ⁴⁴. For paediatric doses, dilution should also be less (see Table 3) ²⁵. In conclusion, a balance between the needs of a fluid-restricted patient and the minimal volume required to dilute medications for EFT administration must be realized ²⁵.

Use protective equipment when crushing drugs like hormones or antibiotics ²⁶

Crushing tablets in open containers such as mortars or medicine pots, or opening capsules to obtain the drug powder contained within, will increase the risks of inhalation by the operator. This could potentially lead to sensitisation, allergies, absorption and possible adverse effects. There is also a danger at ward level of exposure of other staff and patients to drug powder resulting from such manipulations ^b. It is essential that benches and equipment are thoroughly cleaned following such manipulations to remove any drug residues and to ensure the safety of others. Medicines such as corticosteroids, hormones, antibiotics, immunosuppressants, cytotoxics and phenothiazines, are irritant or very potent and extra precautions should be taken when handling these medicines. Exposure to such substances is highly dangerous. Therefore, contact with the skin and inhalation of dust should be avoided, and protective equipment should be used ²⁶, e.g. mask and gloves.

Overview

Table 4 lists an overview of the discussed (see above) recommendations regarding preparation of medications that need to be administered through EFT.

^b If these operations must be undertaken, they should be performed in a room with a closed door and traffic through the room should be limited during the manipulation ²⁶.

Table 4 Guideline recommendations for medication preparation

| Guideline recommendations for medication preparation |
|---|
| Select the most suitable formulation |
| Do not crush sustained release dosage forms |
| Do not crush enteric coated dosage forms in case of gastrostomy |
| Avoid mixing together medications |
| Do not crush tablets together |
| Shake suspensions and emulsions thoroughly before use |
| Open hard gelatin capsules (if allowed) and mix contents with water |
| Dilute solid medication with at least 10 mL of water |
| Dilute liquid medication with at least an equal amount of water |
| Use protective equipment when crushing drugs like hormones or antibiotics |

Guideline recommendations for medication administration

The guideline recommendations found in literature concerning medication administration through EFT, are discussed below.

Do not add medication directly to an enteral nutrition formula ²⁵

Under no circumstances should drugs be added to the enteral nutrition bottle/bag ^{25;26}, despite the convenience of doing so. Adding medication disrupts the sterility of prepackaged enteral nutrition, as well as that of the delivery system used in feeding ⁴⁴. Furthermore, if the feed were to stop or the full volume were not to be delivered, the patient would not receive the prescribed dose of medication, which could have clinically significant consequences ²⁶. Mixing also creates the potential for drug–nutrition interactions, which may lead to feeding tube obstruction, altered drug or nutrient bioavailability, altered gastrointestinal function, or a combination of these. Mixing medication and enteral nutrition requires adequate knowledge of a drug’s compatibility with the formula, and the stability of each component of the final formula as well. Compatibility can be affected by formula-related factors, including type and concentration of protein and its fiber and mineral content, as well as by the drug product’s pH, alcohol and mineral content, viscosity, and osmolarity ^{25;44}. Several papers describe the compatibility of a relatively small number of medications when admixed with a limited number of commercially available enteral nutrition formulas. However, the available data cannot be extrapolated to different formulas of the same medication, different medications in the same drug class, or different enteral feeding formulas ²⁵.

Temporarily hold administration of the enteral nutrition formula during medication administration ²⁵ & Hold the feeding by 30min or more when separation is indicated ²⁵

To avoid drug–feeding interactions, administration of the enteral nutrition formula is temporarily held while each medication is administered enterally. The period of time that the formula is held will depend on the interaction potential between the administered drug and the enteral nutrition formula ²⁵.

- For most medications, stopping enteral feeding and flushing the tube before and after drug administration is sufficient to separate feeding from drug administration; feeding can be resumed after the final flush ⁴⁴.
- For a few drugs a longer nutrition-free interval may be necessary: there are reports of significantly reduced drug efficacy when such drugs (e.g. phenytoin, quinolones, tetracyclines, bisphosphonates) are given too close in time to enteral nutrition. Delaying a feeding is less disruptive for patients on an intermittent feeding regimen than for those on a continuous regimen ⁴⁴.

Flushing of the enteral feeding tube ²⁵

It is impossible to know what quantities of enteral formula, active drug, excipients, and other products are left inside the EFT ⁴⁴. Therefore, regular flushing of the EFT is recommended to prevent interactions between the drugs and/or feed and the potential resulting tube obstructions ^{25;26}:

➤ *Before medication administration, flush with at least 15mL water* ²⁵

Flushing with water helps to prevent interactions between feed and drug in the inner lumen of the EFT ²⁶.

➤ *Between drugs, flush with at least 15mL water* ²⁵

It is recommended to flush between administration of multiple drugs in order to reduce residue within the lumen and to ensure delivery of the total dose ⁴⁴. Flushing the EFT between medications decreases the incidence of occlusions ²⁵.

➤ *After medication administration, flush with at least 15mL water* ²⁵

Flushing after medication administration helps to prevent interactions between feed and drug in the inner lumen of the EFT, and ensures delivery of the total dose of the drug.

The volume used should reflect the dead-space volume of the EFT. Wide-bore EFTs for example, may require a higher volume owing to the large diameter of the inner lumen. The flush should be adequate to prevent build-up on the inner wall of the feeding tube ²⁶. A flush with at least 15 mL water is

recommended, but care should be taken with fluid-restricted patients ^{25;26}. Flush solution volume should also be lower for paediatric doses, at least 5 mL when fluid is not restricted ²⁵.

Preferred flush solution is water ²⁵

The most frequently studied flush solutions to maintain tube patency have been water, carbonated beverages, and cranberry juice. However, water flushes have shown to be the most appropriate and effective method in preventing EFT clogging ^{25;26;53}. Moreover, water is easily obtainable at a low cost ^{25;53}. Therefore, water is the preferred flush solution.

It is generally recommended to use purified water (sterile water for irrigation) or saline as the diluent or flushing vehicle in preference to any other fluid including tap water ^{25;54}. Yet, it is recognized that practices vary in different institutions ⁵⁴. Clear research-based evidence on the type of water that should be used, is lacking. However, some publications mentioned published cases of infections which were traced to tap water flushing ^{25;44;54}. Tap water may contain contaminants, including pathogenic microorganisms, pesticides, pharmaceuticals, and heavy metals that might interact with a drug and reduce its bioavailability ²⁵. On the other hand, it has been reported that drinking water across the European Union is of high quality ⁵⁵. In Europe, (drinkable) tap water has to meet European Union's drinking water standards to ensure drinking water safety ⁵⁶. Yet, although not exceeding microbiological and chemical parameter thresholds, tap water quality may differ from region to region, depending on these parameters' concentrations ⁵⁵. Therefore, choice of water type should depend on local tap water quality, and on local policy ²⁶. Sterile water should be used in immunocompromised or critically ill patients, especially when the safety of tap water cannot be reasonably assumed ²⁵.

Administer using a syringe ≥ 30 mL in size ²⁵

Rupture of the EFT has been associated with syringe size: small syringes create high intraluminal pressures and may damage the tube. In order to reduce the risk of rupturing the fabric of the enteral feeding tube, a syringe of 30 mL or greater is recommended ^{26;57}. However, *Reising & Neal (2005)* reported that no research is available on appropriate syringe size for flushing ⁵⁷. No clear research-based evidence is available on this issue.

Practice recommendations also mention not to use syringes compatible with parenteral device for the administration of enteral drugs, but to use oral/enteral syringes labelled with 'for oral use only' to measure and administer medication through EFT. This way, compatibility with parenteral devices for the administration of enteral drugs is avoided, hence preventing wrong-route errors ^{25;26}.

Elevate the backrest to a minimum of 30° ^{25;26}

The patient should be nursed semirecumbent at an angle of minimum 30°, unless contraindicated (e.g. unstable spine). This semirecumbent position promotes gravity-assisted progression of the fluid, hence reducing reflux of the medication and fluids, and preventing aspiration and pneumonia ^{25;26}.

If used, ensure that the medicine cup is rinsed with water ²⁶

To ensure that the whole dose is given, the tablet crusher/medicine cup should be rinsed and/or water should be drawn up into the used syringe, followed by the administration of this rinsing water through the EFT ²⁶.

Overview

Table 5 lists an overview of the discussed (see above) recommendations regarding the administration of medications through EFT.

Table 5 Guideline recommendations for medication administration through EFT

| Guideline recommendations for medication administration through enteral feeding tube |
|--|
| Do not add medication directly to an enteral nutrition formula |
| Temporarily hold administration of the enteral nutrition formula during medication administration |
| Hold the feeding by 30 min or more when separation is indicated |
| Before medication administration, flush with at least 15 mL water |
| Between drugs, flush with at least 15 mL water |
| After medication administration, flush with at least 15 mL water |
| Preferred flush solution is water |
| Administer using a syringe ≥30 mL in size |
| Elevate the backrest to a minimum of 30° |
| If used, ensure that the medicine cup is rinsed with water |

2.1.2.3. Tube occlusion

Tube occlusion is a possible complication in the use of EFTs. It can be classified as either internal lumen obstruction or mechanical failure/problem with the tube. EFTs may become kinked or knotted while in situ, but internal lumen obstruction is the most common reason for tube occlusion. EFTs become occluded for a variety of reasons, which include ²⁶:

- *Feed precipitate from contact with an acidic fluid:* Occlusions are likely if gastric juices, which have an acidic pH, come into contact with feed solutions. Tubes with tips in the jejunum occlude far less frequently due to the higher pH in the jejunum.
- *Stagnant feed in the tube:* A feed can easily form a clog in a tube if flushes are not given promptly when the feeding is completed or interrupted. Most enteral feeds are suspensions and, when the feed rate is extremely slow or is stopped, the larger particles settle in the horizontal portion of the tube.
- *Contaminated feed:* If there is significant bacterial contamination of the feed, this can cause the feed to precipitate, leading to tube occlusion.
- *Incorrect drug administration:* The use of enteral feeding tubes to administer drug therapy has increased considerably in recent years and may be a significant factor in tube occlusion. Occlusions can be caused by article obstruction from inadequately crushed tablets, precipitate formation from interaction between feed and drug formulation, and precipitate formation from interaction between drugs.
- *Feeding tube properties:* Tube material may be a factor in the rate of occlusion, with polyurethane being less prone to occlusion than silicone. This may be because polyurethane tubes have a larger internal diameter than silicone for the same external size. Wide-bore tubes may be expected to become occluded less frequently than fine-bore tubes, but Metheny et al.⁵⁸ found no difference in occlusion rates between polyurethane tubes of three different sizes. This supports the view that material may be more important than diameter. The number of exit holes at the distal tip of the tube may also be important. Tubes with one exit hole have been shown to become occluded less frequently than those with more. This is possibly due to the greater contact between feed and gastric acid.

Consideration of each of these potential causes can help in reducing the incidence of EFT occlusion²⁶.

Simple flushing with (cold or warm) water (and a lot of patience) in combination with the withdraw/flush method can relieve the obstruction in many patients. If simple water flushing fails to unclog a feeding tube and the clog is caused by feeding, the instillation of pancreatic enzymes may help reopen the occluded tube. If these efforts fail, attempt to clean the tube with mechanical devices^{26;54}. EFTs that cannot be unblocked will need to be replaced, which is distressing for the patient, can increase morbidity, results in lost feeding time and has financial implications²⁶. Therefore, occlusion is best prevented. Using the correct EFT and caring for it properly (e.g. following protocols for flushing and drug administration) should help to reduce the incidence of tube occlusion²⁶.

2.2. Previous research in this setting

Data on the MMP in RCFs for people with ID are limited to two studies from the Netherlands, focusing only on drug administration errors ^{37;59}. *Van den Bemt et al.* studied the frequency of drug administration errors in RCFs for people with ID, and concluded that these errors were common, and rarely reported to the voluntary reporting system. They also found that drug administration via EFT was a determinant for errors (odds ratio 189.66; 95% confidence interval) ³⁷. In follow-up of this study, *Idzinga et al.* conducted a before-after study investigating the impact of an intervention program on the number of administration errors in individuals with an ID and an EFT ⁵⁹. They evaluated the effect of an intervention program designed to reduce errors when administering medication through EFT. Of the 158 medication administration errors before the intervention, 127 concerned a tube-related error, whereas after the intervention a total of 51 tube-related errors was found out of 69 errors. These tube-related errors included (i) wrong dose preparation errors (i.e. medication incorrectly crushed, and medication prepared incorrectly (e.g. not allowing a tablet to disintegrate completely)), (ii) wrong administration technique errors (i.e. EFT not rinsed before, between or after medicines), and (iii) pharmacy advice errors (lacking of advice on the correct way of medication administration: pharmacist did not provide advice). The intervention program showed to be effective, although the proportion of administration errors after the intervention was still considered high (in particular the EFT related preparation errors) ⁵⁹.

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OUTLINE AND AIMS OF THE THESIS

Given the vulnerability of people with ID, the lack of data on the medication management and the complex and difficult matter of medication administration via EFT, the aim of this doctoral research was to evaluate the current medication-related practices in Belgian RCFs. To answer this question, we have proceeded in phases, starting with a descriptive study of the medication management process and with a descriptive study of medication administration via EFT, before undertaking any further steps.

Aim 1: To describe the organization of the medication management process in Belgian residential care facilities for people with intellectual disabilities.

Chapter 2 details the results of a descriptive study investigating the practical organisation of the medication management process (MMP) in Belgian residential care facilities for individuals with ID. Gaining insight in the daily organisation of this process allowed us to identify aspects of the MMP that can be improved.

Aim 2: To collect direct observational data on drug administration practices to residents with an enteral feeding tube in multiple residential care facilities.

Chapter 3 presents the results of an observational study focusing on drug preparation and administration through EFT in residential care facilities for people with ID. As described in the general introduction, medication administration via EFT is complex, and has little been studied in this setting. Therefore, we conducted a cross-sectional, observational study to collect data on drug administration practices to patients with EFT in several residential care facilities for people with ID.

Aim 3: To draw up an inventory of drugs that are routinely administered through enteral feeding tubes in people with intellectual disabilities in Belgian residential care facilities.

Chapter 4 gives an overview of the medications used by individuals with ID and an EFT in Belgian residential care facilities. The principal aim of this overview was to draw up an inventory of drugs that are routinely administered through EFT in individuals with intellectual disabilities in this setting.

Aim 4: To identify barriers and facilitators experienced by residential care facility staff members to following guidelines on medication administration via enteral feeding tube.

Chapter 5 describes the results of a qualitative study identifying possible barriers and facilitators to following guidelines on medication administration via EFT. From our observational study (Chapter 3) we learned that guidelines for the administration of medication through EFT are often not followed in residential care facilities for people with ID. However, insight into the possible barriers to adherence to guidelines may facilitate the implementation of guidelines in clinical practice. Therefore, we conducted a qualitative study, using focus groups, to explore the barriers and facilitators experienced by RCF-staff members to following guidelines on medication administration via EFT.

Aim 5: To investigate knowledge of these recommendations among staff of residential care facilities for people with intellectual disability.

In **Chapter 6**, we investigated the knowledge of staff members of residential care facilities for people with ID on current guidelines for drug administration through EFT. In our qualitative study (Chapter 5), lack of knowledge of guidelines emerged as an important barrier perceived by the staff members. Since data on staff's knowledge may be highly valuable for the development of tools and interventions aimed at improving guideline implementation, we conducted this questionnaire study among staff members of residential care facilities for people with ID.

Aim 6: To investigate community pharmacists' knowledge on current guidelines for medication administration via enteral feeding tube.

Chapter 7 reports on community pharmacists' knowledge of guidelines for medication administration via EFT. Community pharmacists may be ideally placed to provide training and advice on this topic. However, their level of knowledge determines the quality of their advice. In order to assess community pharmacists' actual knowledge on medication administration via EFT, a questionnaire study was conducted.

Chapter 2: MEDICATION MANAGEMENT IN RESIDENTIAL CARE FACILITIES FOR INDIVIDUALS WITH INTELLECTUAL DISABILITY: AN OBSERVATIONAL STUDY

This chapter was published as:

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ABSTRACT

Background: Organizational aspects of the medication management process (MMP) have been investigated in the hospital setting as well as in the nursing home setting. However, the amount of literature on medication management in residential care facilities (RCF) for individuals with intellectual disabilities (ID) is limited to two studies from the Netherlands, focusing only on drug administration errors.

Specific Aims: To describe the organization of the MMP in Belgian RCFs for people with ID.

Method: This cross-sectional, observational study was conducted in 34 Belgian RCFs for people with ID. Structured interviews were performed using a questionnaire: the first part (for the RCF directors) addressed administrative and policy issues. The second (for unit employees) and third part (for medical office employees) addressed practical aspects of the MMP. The fourth part (for physicians) focused on the physician's role in the MMP, on the therapeutic drug formulary, and on communication with staff and delivering pharmacist.

Findings: Standard operating procedures concerning the MMP were not available in 32% of the RCFs. About one quarter of the RCFs did not have a medication error reporting system, and most RCFs did not systematically (i.e. at least annually) review their MMP for failures. Only two participating RCFs were equipped with an electronic prescribing system. The role of the pharmacist was mainly limited to delivery of medication. Medication was mostly administered by non-medically qualified staff, e.g. educators. Most frequently cited problems by the interviewees were problems in the medication preparation and administration stage. Most frequently cited possible improvement actions were education/sensitization of staff and improved communication between all stakeholders.

Conclusion: This study provided an overview of the organization of the MMP in Belgian RCFs for people with ID. Based on these results, problem areas can be identified and targeted quality improvement actions can be undertaken.

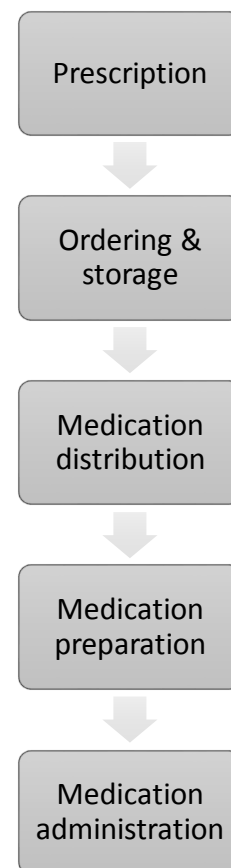
Keywords: intellectual disability, medication management process, medication, organization, residential care facility

INTRODUCTION

The safety of medication use in health care facilities is an international concern that attracts the attention of policy makers and clinicians ¹⁻³. To ensure drug safety, all stages of the medication use process – selection, prescribing, ordering, storage, dispensing, administration and monitoring –must be appropriately integrated into a comprehensive medication management process (MMP) (Figure 1). Such a system encompasses standard procedures for medication handling in health care facilities (e.g. safe and appropriate drug storage, and correct drug administration) ⁴.

It is known that people with ID have more health problems, e.g. epilepsy, sensory loss, constipation and psychotic disorders, than people without ID. The prevalence of comorbidities associated with ID is high, and increases with severity of ID ⁵⁻⁷. As a consequence, this population uses a lot of medication. For example, a small study from *Idzinga, de Jong, & van den Bemt* ⁸ observed a mean of seven medications per resident. This high medication intake may increase the risk for medication errors, as has been demonstrated in another population (i.e. the elderly) ⁹. Moreover, overuse of medication has been described in people with ID, at least for antipsychotics ¹⁰⁻¹².

Furthermore, individuals with ID may not be aware of medication administration errors due to their cognitive impairment, which puts them at increased risk ¹³. As a consequence, in order to ensure drug safety, it is important for residential care facilities (RCF) for individuals with ID to have a well-organized MMP. Although research is available on other services for people with ID, e.g. physical activity ^{14;15}, cancer ¹⁶, and women's health issues ¹⁷, data on the MMP in RCFs for this population are limited to two studies from the Netherlands, focusing only on drug administration errors ^{8;13}. *Van den Bemt et al.* ¹³ studied the frequency of drug administration errors, and concluded that these errors were common, and rarely reported to the voluntary reporting system. In follow-up of this study, the same authors conducted a before-after study investigating the impact of an intervention program on the number of administration errors in individuals with an ID and an enteral feeding tube ⁸. This program showed to



Figuur 1 Medication management process

be effective, although the proportion of administration errors after the intervention was still considered high. The MMP has been studied most intensively in hospitals ^{18;19}, and to a lesser extent in the nursing home ^{20;21} and mental health care setting ²². These studies found that most medication errors were associated with drug administration (e.g. wrong dose, omission, wrong time) and prescribing. Adopting computerized physician order entry (CPOE) with automated clinical decision support systems (CDSS), implementing protocols and guidelines, training and education of staff, and/or pharmacist involvement have shown effectiveness in reducing medication error rates in one or more of these settings ¹⁸⁻²². Regarding the practical organization of the MMP, therapeutic drug formularies and medication error reporting systems showed to be generally available in the hospital ²³⁻²⁵ and nursing home setting ^{26;27}. Medication is also mostly administered by nurses, but variability is seen in procedures and policies between different facilities or even within one facility ²⁴⁻²⁷.

As the situation in RCFs for individuals with ID differs considerably from the hospital and nursing home setting (for example medically qualified staffing levels are much lower than in the hospital/nursing home), results from studies in other settings cannot easily be extrapolated. However, the American Society of Health-System Pharmacists (ASHP) has formulated recommendations on preventing medication errors in hospitals, but has also stated that ideas and principles may be applicable to practice settings other than hospitals ²⁸. Also the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) has formulated recommendations ³. These standards are applicable to a lot of settings, including the long term care setting.

In order to provide data on the current status of the MMP in RCFs for individuals with ID, we conducted an observational study of the entire MMP in this setting. The main goal of this research study is to describe current practice in these RCFs, and to identify those aspects of the MMP that can be improved in order to optimize care for this vulnerable patient population.

METHODS

Study design

This study is a cross-sectional, observational research study in RCFs for individuals with an ID. It was conducted in Flanders (the Dutch-speaking part of Belgium) from November 2010 till March 2011. The study protocol was approved by the local Ethical Committee. All interviewed staff members provided informed consent.

Sample

All Flemish RCFs with residential care for children and adults with an ID (n=53) were invited to participate. These RCFs are relatively large campus-style accommodations that offer (semi-) residential care to people with mild to profound ID (often associated with other disabilities). They provide medical, pedagogic, psychological and social services, and are often linked to special schools. In *Europe*, there is a determined movement towards deinstitutionalization of people with ID. However, the stage and the policies related to this process vary from country to country and show a heterogeneous picture. In *Belgium*, The Netherlands, Germany, Spain, Greece, Italy and Portugal there is still a varying pattern of institutional care. Even though the number of people in large residential institutions is decreasing, institutional care is still dominant compared to the UK (where the process of deinstitutionalization is well advanced) and countries such as Sweden and Norway (where residential institutions for people with ID have been completely closed and no one with ID lives in institutional settings anymore)^{29;30}. A typical RCF in Flanders consists of a medical office and several units. The medical office is a physical location within the RCF where all medical records are centralized, and where the practical aspects of the MMP (such as ordering, storage, distribution of medication) is generally coordinated. The medical office is staffed by (a) nurse(s) and sometimes (a) physician(s). A unit is a living group of approximately 10 residents, where daily care and support is provided by educators and/or caretakers and/or nurses. Because of the possible between-unit variation in MMPs, in this study two randomly chosen different units were included per participating RCF whenever possible.

Data collection

The questionnaire of a previous study on medication management in nursing homes²⁷, was adapted for collecting information on the MMP in RCFs for persons with ID. The questionnaire consisted of four sections. The first part (for the director of the RCF) addressed mainly administrative and policy issues: e.g. resident and staff characteristics, and medication management policy. The second part (for a unit employee) and the third part (for a staff member of the medical office) addressed practical aspects of the MMP (i.e. how drugs are prescribed, ordered, delivered, distributed and administered within the unit/RCF). The fourth part (for the physician, or a staff member of the medical office in case no physician was employed by the RCF) focused on the role of the physician in the MMP, on the therapeutic drug formulary, and on communication with staff and delivering pharmacist(s). The full questionnaire was checked for clarity and relevance by a physician and a remedial educationalist, and was pretested with a nurse, all familiar with health care provision for persons with ID. The final version of the questionnaire is available upon request. The developed questionnaire served as the basis for a structured interview (conducted by EJ) with the different employees in the MMP within the RCF.

Data analysis

Each RCF was assigned a unique identification number to protect their privacy. Data obtained in the interviews were structured according to a predefined list of topics discussed during the different parts of the interviews. Descriptive statistical analysis was performed using SPSS 18.0 for Windows (SPSS Inc, Chicago, IL, USA). A feedback report with the results of this study has been sent to all participating RCFs.

RESULTS

Among the 53 eligible RCFs, 6 refused participation and 13 did not answer telephone or e-mail despite several attempts. This resulted in a final sample of 34 participating RCFs. Overall 34 directors, 54 unit employees and 65 medical staff members (i.e. 42 nurses and 23 physicians) were interviewed. Characteristics of the participating institutions are shown in Table 1.

Medication management policy

Twenty-eight of 34 directors (82%) reported having a quality system (i.e. the organizational structure, procedures, processes and resources needed to implement quality management, including for example how medical care is organized) in the RCF. Standard operating procedures (SOPs) for medication management were available in 23 of 34 RCFs (68%). However, only 38% (15/39) of the interviewed unit employees from a RCF with an SOP for medication management, actually used these SOPs. The majority of the directors (29/34, 85%) reported having (a) staff member(s) responsible for the quality of medication management: medically qualified staff (e.g. physician and/or nurse) (n=22), non-medically qualified staff (e.g. boarding school administrator, quality coordinator) (n=4), or a combination of both (n=3).

Six of 34 RCFs (18%) systematically (i.e. at least annually) evaluated the MMP. Twenty-five RCFs (74%) performed such an evaluation less than once a year or ad hoc (i.e. in case of problems or changes), whereas three RCFs (9%) never evaluated the MMP.

In 26 of the 34 RCFs (77%) a medication error reporting system (recording all reported medication errors throughout the RCF) was set up. However, only about half of them (14/26) also had an SOP for this system. In about three-quarters (19/26), a reported error resulted in actions taken to prevent the error in the future. In 13 of the 34 RCFs (38%), medical office employees remembered a serious medication error, leading to hospitalization, had occurred during their employment in the RCF.

Table 1 Sample characteristics

| SAMPLE CHARACTERISTICS | |
|--|--------------|
| <i>Residential care facilities (RCF) (n=34)</i> | |
| Type of RCF | |
| Residential | 9 (26%) |
| Residential & semi-residential | 25 (74%) |
| Type of intellectual disability (ID) | |
| Mild ID | 2 (6%) |
| Mild & moderate ID | 2 (6%) |
| Moderate & severe ID | 12 (35%) |
| Mild, moderate & severe ID | 18 (53%) |
| Capacity, median (range) | 213 (40-466) |
| < 100 residents | 9 (26%) |
| 100-200 residents | 8 (24%) |
| 200-300 residents | 6 (18%) |
| > 300 residents | 11 (32%) |
| Physicians | |
| Physician(s) in staff & visiting physician(s) | 22 (65%) |
| Only visiting physician(s) | 8 (24%) |
| Only physician(s) in staff | 4 (12%) |
| Nurses | |
| At least one in staff | 31 (91%) |
| Nurse in the associated school | 2 (6%) |
| No nurse | 1 (3%) |
| <i>Participating units (n=54)</i> | |
| Age residents (years), median | 16 |

* Data are presented as n (%), unless indicated otherwise

Prescription

In only two RCFs (6%) an electronic prescribing system was implemented. All others only used paper prescriptions. Six RCFs (18%) had a therapeutic drug formulary, which was not binding, meaning that physicians could prescribe nonformulary medication without having to justify their choice.

In 29 of 34 RCFs (85%), physicians reviewed the residents' drug therapy on a systematic basis (n=20), or sporadically (i.e. in case of problems) (n=9). When reviewed systematically, this review was performed every two years (2/20), annually (12/20), or at least once every six months (4/20); two could

not recall exactly how frequently this was performed. For this medication review, the physician was assisted by:

- nurses (20/29 and 1/29, respectively ‘always present’ and ‘when necessary’),
- unit employees (9/29 and 15/29, respectively ‘always present’ and ‘when necessary’), or
- others like physical therapists, remedial educationalists or teachers (15/29 and 1/29, respectively ‘always present’ and ‘when necessary’).
- The delivering pharmacist was *never* involved.

Medication history and prescriptions were translated into medication records in all 54 participating units. The medication records were computer-generated in 50 units (93%) and handwritten in four (7%). Medication records always contained all chronic oral medication, but other types of medication were sometimes missing: injections were not included in the medication record in 13 of 54 units, dermatologic preparations in 11 of 54, medication administered <1x/day (e.g. weekly, monthly) in 7 of 54, rectal medication in 5 of 54, and eye/nasal drops in 3 of 54 units. In about half of the units (26/54) the medication record was checked regularly against the resident’s medical record. This was carried out by medically qualified staff (physician and/or nurse) (15/26, 58%), by non-medically qualified staff (6/26, 23%), or by a combination of both (5/26, 19%).

Medication ordering and storage

All RCFs purchased their medication from a community pharmacy. The services offered by the delivering pharmacists are displayed in Table 2.

Table 2 Pharmacy services provided to the RCFs (n=34)

| <i>Service</i> | <i>n (%)</i> |
|--|--------------|
| Medication dispensing | 34 (100) |
| Provision of drug information | 20 (59) |
| Filling pill organizers | 2(6) |
| Involvement in governing the medication management process | 1(3) |
| Reviewing drug therapy | 0 (0) |

In most RCFs (30/34, 88%) ordering of medication was centralized in the medical office, whereas in four RCFs (12%) medication was ordered by the unit employees (two of these RCFs did not have a medical office). In only four RCFs (12%), the pharmacy delivered medication in a legally mandated way³¹, i.e. resident name mentioned on each original medication package and all packages of one resident packaged together (2/4), or in pill organizers per resident (1/4), or in multi-dose bags per resident (1/4).

Medication distribution

Medication arrived at the unit in:

- the original package (27/54),
- one-week pill organizers (21/54),
- one-day pill organizers (1/54),
- medication cups per moment of administration (3/54), or
- multi-dose bags (2/54).

In 22 of the 27 units where medication was delivered in the original package, unit educators and/or nurses removed tablets from their package and put them in pill organizers.

Medication redistributed in a pill organizer (n=45 units), was systematically checked for correctness in 29 units (64%). In one unit (2%) random checks were performed, and in 15 units (33%) correctness was never checked.

Medication preparation and administration

In 32 of the 54 units (60%), drugs were crushed when needed. Reasons for crushing were: swallowing problems (23/32), drug administration through enteral feeding tubes (12/32), and covert drug administration because of behavioral problems (12/32). In most of these units (28/32, 88%), staff members consulted information before crushing: physician and/or nurse(s) were the main source (26/28, 93%) of information about drug crushability.

Before administration, prepared medication was checked against the medication record or by pill count in 31 of the 54 units (57%), while in 23 units (43%) no control was performed. Medication was mainly administered by educators (in 98% of the units (53/54)). In addition, medication was also administered by educators in training in 50% (27/54), by nurses in 41% (22/54) and/or by others like therapists and caretakers in 13% (7/54) of units. Medication administration records were kept in 20 of the 54 units (37%).

Medication management problems according to the staff

All interviewed unit employees, medical staff members and physicians (n=119) were questioned about the occurrence of medication management problems in their RCF. Most of them (107/119, 90%) reported that there were problems. The three most frequently cited problems were:

- 1) drug administration errors (e.g. wrong resident, wrong dose) (41/107, 38%),
- 2) forgotten drug administrations (34/107, 32%), and
- 3) the role of the residents' parents in medication administration at home (e.g. poor drug adherence during weekends when residents are at home) (22/107, 21%).

Sixty-eight percent (81/119) of the respondents proposed actions to improve the quality of the MMP. The three most frequently cited improvement actions were:

- 1) education and sensitization of the staff (18/81, 22%),
- 2) improved communication between all health caretakers involved in medication management (14/81, 17%), and
- 3) modifications in the medication preparation and administration process (e.g. preparation and administration by nurses instead of by non-medically qualified staff) (12/81, 15%).

DISCUSSION

This study is the first to describe the whole MMP in RCFs for individuals with ID, with the intention of identifying possible actions for quality-of-care improvement. As this sector has limited resources, simple and low-cost improvement actions are preferred. The main finding of this study is that the MMP in Belgian RCFs for people with ID is suboptimal, both at policy level and at unit level. In the next paragraphs we will compare current practice to ASHP and JCAHO recommendations (when possible).

Medication management policy

Regarding the **general aspects of the medication management**, we identified three aspects that could be improved. *First*, ASHP recommends developing comprehensive policies and procedures to ensure the safe handling of medicines ²⁸. In our sample, SOPs concerning the medication management were not generally present. Moreover, only a minority of the unit employees of RCFs having SOPs actually used them. Nevertheless, the use of SOPs is regarded as a prerequisite for safe and appropriate medication management ^{28;32}. *Second*, ASHP ²⁸, JCAHO ⁴ and others ^{4;33;34} recommend implementation of an error reporting system, which encourages staff members to voluntarily report medication errors (without punitive actions in the event of an error). A consistent analysis of the collected data can reveal aspects of the MMP that need to be changed to improve safety and reduce the risk of reoccurrence and of harm to the residents. Yet, in our sample about one quarter of the RCFs did not have a medication error reporting system. A study in nursing homes revealed a similar number (30%) not having such a system ²⁷, while a study in the hospital setting found that an error reporting system was present in all investigated hospitals ²⁵. *Third*, JCAHO ³ and Leape ³² also advise to evaluate the MMP on

an ongoing basis for risk points, hence identifying areas that need to be adapted in order to improve safety. A frequent (at least annual), proactive evaluation of the MMP involving all stakeholders (medical office employees, director, unit employees and pharmacist) is recommended. However, only a minority of our sample systematically reviewed their MMP, against a majority (60%) in nursing homes²⁷.

Main problems in the practical organization of the MMP

Regarding the **practical organization of the MMP**, we observed a large variation in procedures between the participating RCFs, and even between units within the same RCF. This corresponds to findings in the hospital^{24;25} and nursing home setting^{26;27}. The use of SOPs is a simple strategy to uniformize working procedures. In fact, we observed problems at the stages of prescription, ordering, and medication preparation and administration.

Only two of the participating RCFs were equipped with an electronic **prescribing** system. Transcription of paper prescriptions into medication records is a potential source of errors, which could be reduced by electronic prescribing^{1;19;35;36}. These systems can also be equipped with clinical decision support which may further improve patient care, as supported by studies in the hospital^{19;35-38} and nursing home setting²⁰.

Concerning **medication ordering**, we noticed only 4 of 34 RCFs received their medication from the delivering pharmacist in a legally mandated way³¹. Furthermore, the role of the pharmacist was mainly limited to delivery of medication. Yet, the medication-related expertise and advice of pharmacists could be useful in optimizing the MMP. ASHP advises the pharmacist to participate in appropriate organizational committees of the RCF and to work with physicians, nurses, administrators, and others to examine and improve systems to ensure that medication processes are safe²⁸. Moreover, in the hospital and nursing home setting it has been described that pharmacists, participating in multidisciplinary teams, participating during ward rounds or reviewing medication records, can optimize pharmacotherapy of the patient and prevent medication errors, hence improving patient safety^{18;39-43}. Although we cannot extrapolate these results to our setting, it indicates the potential of a pharmacist's contribution to the MMP.

Looking at the **preparation and administration process**, we noticed many problems. Non-medically trained staff members (e.g. educators) were often responsible for the preparation and administration of drugs in the RCF. This is in contrast with the hospital and nursing home setting, where nurses are responsible for administering medication^{27;44}. It has been described that even trained nurses often lack adequate pharmacological knowledge for drug administration⁴⁵⁻⁴⁷, for example concerning the crushability of drugs⁴⁸. Also during our interviews, it became clear to us –albeit “off the record”- that several unit employees were unaware of even the existence of drugs that cannot be crushed. Therefore

continuous training of staff on proper drug administration is particularly important, a fortiori when non-medically trained staff members are involved. Again this could be a role for the delivering pharmacist^{49;50}. This need for more training and education is confirmed by the fact that a majority of the interviewed staff members reported actually having problems with medication preparation and administration within the RCF, and proposed education/sensitization of staff and improved communication between all stakeholders as part of the solution. This suggests that staff is actually aware of the importance of drug safety, and is receptive for improvement initiatives.

In Europe there is a trend towards deinstitutionalization for people with ID. In our study we did not collect data on the MMP at home, while interviewed staff hinted at less medication adherence during weekend leave. However, we found that even in RCFs (which are likely to have more health trained staff available) the MMP still has much room for improvement. Thus, in this process of deinstitutionalization, keeping balance between integration in the community and meeting the medication related health care needs should be borne in mind.

Limitations and strengths

The main limitation of this study is that results are based on face-to-face interviews. This may have led to socially desirable answers, meaning that our data may reflect an underestimation of the problems in real world MMP. However, it was explained clearly that the interview was purely academic and non-punitive. Our study has several strengths. Main strength is that this is, to our knowledge, the first study assessing the organization of medication management in RCFs for individuals with ID. Furthermore, the majority of the eligible RCFs participated, which has enabled us to obtain an overall picture of current practice in RCFs for individuals with ID. Aspects of our questionnaire may be used as a self-evaluation tool for the RCFs, as a start for optimizing their MMP.

CONCLUSION

This study provides an overview of the organization of the MMP in RCFs for individuals with ID. Based on our observations, recommendations for improvement actions can be proposed: the use of SOPs and error reporting systems, a frequent (at least annual), proactive evaluation of the MMP, an expansion of the role of the pharmacist, and education and training of staff. As the report “To err is human”¹ did for the hospital setting, we hope that our study incites RCFs for people with ID to take a close look at their MMP in order to optimize care for this vulnerable patient population that is subject to high levels of medication use and polypharmacy.

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Chapter 3: DRUG ADMINISTRATION VIA ENTERAL FEEDING TUBES IN RESIDENTIAL CARE FACILITIES FOR INDIVIDUALS WITH INTELLECTUAL DISABILITY: AN OBSERVATIONAL STUDY

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ABSTRACT

Background: The administration of oral medication to patients with an enteral feeding tube (EFT) is challenging. Compliance to guidelines concerning medication administration via EFT has been investigated extensively in the hospital setting. However, studies in residential care facilities (RCFs) for individuals with intellectual disability (ID) are very limited. Therefore, the present study aimed to collect direct observational data on drug administration practices to residents with EFT in multiple RCFs.

Method: This cross-sectional, observational study was conducted in six Belgian RCFs for individuals with ID. Observations of medication preparation and administration through EFT were carried out in two randomly selected units per participating RCF, on two days per unit during all daytime drug rounds, using a direct observation method. Afterwards, the recorded observations were compared with international guidelines on drug preparation and administration through EFT.

Results: In total, 862 drug preparations and 268 administrations in 48 residents with EFT were witnessed. Mixing together multiple drugs, not diluting liquid formulations with at least an equal amount of water, not shaking suspensions/emulsions before use, and not selecting the most appropriate dosage form were the most common deviations from medication preparation guideline recommendations. For medication administration, not flushing the EFT with at least 15mL water was the most common deviation. We also observed high variability in working methods regarding medication preparation and administration via EFT, even between staff members of the same unit.

Conclusion: This study found that current guidelines concerning medication preparation and administration through EFT are often not followed in Belgian RCFs for individuals with ID. Further research aimed at understanding why current guidelines are not followed seems warranted.

Keywords: intellectual disability, residential care facility, medication, enteral feeding tube, gastrostomy, guidelines

INTRODUCTION

Feeding problems are highly prevalent in people with intellectual disabilities (ID). Severe/profound ID is often associated with problems regarding feeding skills (e.g. motor coordination and muscle tone) and with an increased aspiration risk ¹. Therefore, this population often depends on an enteral feeding tube (EFT) for both feeding and the administration of drugs ^{1;2}. The administration of oral medication through the feeding tube is however challenging and may present some pitfalls. Firstly, when no appropriate liquid dosage form is available, solid dosage forms are often crushed and suspended in an amount of water to enable drug administration through the EFT ^{3;4}. However, not all oral solid dosage forms are suitable for crushing. In case of sustained release formulations (when administered through gastrostomy as well as jejunostomy), crushing leads to an immediate release of the total drug dose, which is higher than the total drug dose in regular immediate release formulations ^{2;3}. This may cause drug toxicity, as was demonstrated by a case in which a crushed sustained release nifedipine tablet led to a patient fatality ⁵. In case of enteric coated formulations (when administered through gastrostomy), crushing may result in loss of drug efficacy or irritation of the gastric mucosa (depending on the reason for enteric coating) ². Secondly, inappropriate drug formulations may cause tube obstructions; e.g. the administration of bulk-forming laxatives or inadequately crushed tablets, or the administration of a “cocktail” of several oral dosage forms, possibly together with feeding, is associated with an increased risk for tube clogging ^{2;4}. Thirdly, concurrent administration of oral medication and enteral feeding may lead to drug-nutrient interactions; e.g. concurrent administration of enteral feed and phenytoin leading to a reduced phenytoin absorption and therapeutic effect ^{2;6-8}. Similarly, mixing together multiple drugs for administration through EFT may result in physicochemical incompatibilities ^{2;3}. These unwanted and often unforeseen risks with drug administration through the EFT, can lead to patient harm or even death ⁵. Besides, administering a drug via an EFT usually falls outside the terms of the drug’s product license, resulting in the prescriber, dispenser and administrator becoming liable for any harm that occurs from taking the medication ².

To reduce these risks, guidelines for the administration of medication through EFT have been issued. These include careful selection and preparation of appropriate dosage forms, withholding feeding during drug administration, separate administration of drug doses and adequate flushing of the EFT ^{2;3}. However, research investigating whether these special precautions are actually followed in residential care facilities (RCFs) for individuals with ID is limited to two studies from the Netherlands. *Van den Bemt et al.* studied the frequency of drug administration errors in one RCF for residents with ID (with and without EFT) ⁹. They found that errors were common and that drug administration via EFT was a determinant associated with errors (odds ratio 189.66; 95% confidence interval). In a follow-up study, the same authors evaluated the effect of an intervention program designed to reduce errors when

administering medication through EFT ¹⁰. This program showed to be effective, although the proportion of administration errors after the intervention was still considered high (in particular the EFT related preparation errors). In the hospital setting, compliance to guidelines concerning drug administration via EFT has been studied more extensively ¹¹⁻¹⁷. These studies all observed deviations from guidelines to a certain extent (e.g. mixing several drugs together, crushing of modified-release formulations, not flushing EFTs,...) ^{12-14;16;17}. Moreover, a recent study investigating the role of the clinical pharmacist in improving medication administration through EFT, found that most nurses did not have sufficient knowledge about rules of drug administration via EFT ¹⁸. In RCFs for people with ID, medication is mainly administered by non-medically trained staff (e.g. educators) ¹⁹, which may lead to even more errors. In addition, residents with ID are especially at risk for medication errors due to their high medication use ¹⁰ and the fact that they may not be aware of errors because of their cognitive impairment ⁹.

Therefore, the present study aimed to collect direct observational data on drug administration practices to patients with EFT in several RCFs for people with ID.

METHODS

Study design and setting

This cross-sectional, observational study was conducted from March to June 2012 in RCFs for individuals with an ID in Belgium. We approached six randomly selected RCFs with at least 10 residents with EFT. All six agreed to participate. The RCFs included in this study are relatively large campus-style accommodations. They offer (semi-) residential care to people with mild to profound ID (often associated with other disabilities), who cannot be cared for at home. These RCFs provide medical, pedagogic, psychological and social services, and are often linked to special schools. Approval for the study was granted by the local Ethical Committee. All directors of the RCFs and the observed staff members gave written informed consent. For the observed residents we used an opt-out arrangement (i.e. residents' parents or guardian were offered the opportunity to opt-out of study participation by signing an opt-out form) ^{20;21}.

Data collection

Observations of medication administration through EFT were carried out in two randomly selected units of the participating RCFs. A unit is a living group of approximately 10 residents, where daily care and support is provided by educators and/or caretakers and/or nurses. A direct observation method ^{22;23} was used with two observers witnessing preparation and administration of drugs through EFT on

two random days per unit, during all daytime drug rounds (from 6 am to 9 pm). The observers wrote down exactly what the nurses did during the preparation and administration of medication. Data recorded included resident codes, drug product, dosage form, amount of drug, and all procedures related to medication preparation (e.g. tablet crushing) and administration (e.g. stopping enteral feeding). Afterwards, the recorded observations were compared with international guidelines on drug preparation and administration through EFT ^{2;3;24;25}. An expert panel of three pharmacists (E.J., E.M., K.B.) selected the A.S.P.E.N. guidelines ^{3;24}, and the Handbook of Drug Administration via Enteral Feeding Tubes by ² as guideline standards. As these guidelines do not provide a concrete advice concerning the dilution of medication before administration through the EFT, a literature review on this topic was undertaken that identified several extra recommendations ^{8;25;26}. All recommendations agree on the necessity of diluting ^{2;3;8;24-26}, but there seems to be inconsistency regarding the amount of liquid used. For liquid medication, the recommendations vary from 'dilute as appropriate' ^{3;24}, over 'dilute with an equal amount' ²⁵, or 'with 10-30mL' ²⁶, to 'dilute with at least with 30mL' ⁸. Therefore, the expert panel decided to select the minimal, concrete advice available in these guidelines as guideline standard, i.e. 'dilute with an equal amount'. For dilution of solid medication, 'dilute with at least 10mL' was chosen as the minimal, concrete advice. The guidelines for respectively medication preparation and medication administration are detailed in Table 1 and 2 (first column). In addition, the following resident characteristics were collected: age, sex, weight, severity of ID, type and size of EFT, and type of enteral feeding regimen.

Data analysis

Descriptive data analysis was performed using Microsoft Excel 2010. All data were processed anonymously.

RESULTS

The parents of one resident opted out of study participation. A total of 11 nurses and 28 educators/caretakers were observed during the study period. Altogether 862 drug preparations and 268 administrations (one administration is defined as one administration moment to one resident, independent of the number of drugs administered at that moment) in 48 residents with EFT were witnessed. Resident characteristics are displayed in Table 3. Residents received multiple medications via EFT, with a median of six per resident (range 1-14). We also noticed that there were differences in working methods during medication preparation and administration, not only between the RCFs, but also between units in the same RCF, and sometimes even within the same unit.

Medication preparation

About 55% of the prepared drugs (470/862) were solid dosage forms (Table 4), with 1.7% (15/862) being non-crushable (i.e. sustained release formulations for administration through gastrostomy as well as jejunostomy, and enteric coated formulations for administration through gastrostomy). These formulations included sustained release formulations of valproic acid (n=4) and carbamazepine (n=3), and enteric coated formulations of omeprazole (n=4), esomeprazole (n=2) and pantoprazole (n=2). Valproic acid (121/862), baclofen (70/862) and levetiracetam (58/862) were the three most frequently prepared drugs (Table 5).

Table 1 summarizes all recommendations found in literature relating to medication preparation procedures, as well as the frequency of their relevance and their implementation in our observations. Mixing together multiple drugs was the most common deviation from guidelines. About two thirds (69%, 599/862) of the prepared drugs were mixed together before administration, which generated 165 cocktails. These cocktails were combinations of 2 drugs (53/165, 32%), 3 drugs (47/165, 28%), 4 drugs (19/165, 12%), or ≥ 5 drugs (46/165, 28%; max. 8 drugs).

Other frequently observed deviations from guidelines were: not diluting liquid formulations with at least an equal amount of water, crushing different tablets together, not shaking suspensions/emulsions before use, and not selecting the most appropriate dosage form. Only about half (210/392, 54%) of the liquid dosage forms were diluted with at least an equal amount of water, whereas forty-five per cent (177/392) of them were not diluted at all. A total of 155 drugs was crushed. We observed considerable variability in crushing methods: in 64% conventional crushing devices were used (commercial pill crusher (63/155) or pestle and mortar (36/155)), while in 36% non-conventional devices were used (pestle and metal cup (42/155), or two metal cups (14/155)). We noticed that crushing devices were often shared and not cleaned between drug preparations for different residents. Hence, cross-contamination was possible in 45 of 268 (17%) medication administrations. In all residents, at least one deviation from medication preparation guidelines was observed.

Drugs were prepared ≤ 15 min (499/862), 16-30 min (132/862), 31-60 min (58/862), and > 60 min (170/862) before administration to the resident (max. 21h). In three cases (3/862), the time span between preparation and administration could not be determined as the prepared drug was not administered (resident went home or was too nauseated).

Table 1 Medication preparation: recommendations found in literature, and the frequency of their relevance and implementation in our sample of 862 observed drug preparations

| Guideline | Guideline relevant | Observations NOT compliant with guideline | | Top 3 drugs involved in non-compliance (n) |
|--|--------------------|---|--------|--|
| | <i>n</i> | <i>n</i> | %* | |
| Avoid mixing together medications ^{a,b} | 862 | 599 | 69.5% | N.a. |
| Dilute liquid medication with at least an equal amount of water ^d | 392 | 182 | 46.4% | Valproic acid (38), levetiracetam (28), omeprazole (23) |
| Do not crush tablets together ^c | 155 | 130 | 83.9% | N.a. |
| Shake suspensions/emulsions thoroughly before use ^{a,b} | 127 | 65 | 51.2% | Alginic acid (25), domperidone (11), omeprazole (11) |
| Select most suitable formulation ^{a,b} ** | 862 | 58 | 6.7% | Levetiracetam (9), carbamazepine (7), levodopa/benserazide (6) and lorazepam (6) |
| Dilute solid medication with at least 10mL of water ^d | 470 | 29 | 6.2% | Baclofen (9), topiramate (5), phenobarbital (3) |
| Open hard gelatin capsules (if allowed) and mix contents with water ^{a,b} | 134 | 28 | 20.9% | Phenobarbital (13), baclofen (10), glycopyrronium bromide (2) and nitrofurantoin (2) |
| Do not crush sustained release dosage forms ^{a,b} | 7 | 7 | 100.0% | Valproic acid (4), carbamazepine (3) |
| Do not crush enteric coated dosage forms in case of gastrostomy ^{a,b} | 8 | 6 | 75.0% | Esomeprazole (2), omeprazole (2), pantoprazole (2) |
| Use protective equipment when crushing drugs like hormones or antibiotics ^b | 6 | 6 | 100.0% | Levothyroxine sodium (6) |

* Percentage calculated on *n*_{relevant}^a Bankhead et al. (2009)^b White & Bradnam (2007)^c British Association for Parenteral and Enteral Nutrition (2013)^d Boullata (2009)

** If available, use liquids or dissolvable/dispersible tablets

N.a., not applicable

Medication administration

Table 2 summarizes all recommendations found in literature relating to medication administration procedures, as well as the frequency of their relevance and their implementation in our observations.

Table 2 Medication administration: recommendations found in literature, and the frequency of their relevance and implementation in our sample of 268 observed drug administrations

| Guideline | Guideline relevant | Observations NOT compliant with guideline | |
|--|--------------------|---|--------|
| | <i>n</i> | <i>n</i> | %* |
| Before medication administration, flush with at least 15mL water ^{a,b} | 268 | 265 | 98.9% |
| Administer using a syringe ≥ 30 mL in size ^a | 268 | 165 | 61.6% |
| Elevate the backrest to a minimum of 30° ^{a,b} | 268 | 130 | 48.5% |
| If used, ensure that the medicine cup is rinsed with water ^b | 243 | 130 | 53.5% |
| After medication administration, flush with at least 15mL water ^{a,b} | 268 | 90 | 33.6% |
| Between drugs, flush with at least 15mL water ^{a,b} | 83 | 82 | 98.8% |
| Preferred flush solution is water ^{a,b} | 246 | 44 | 17.9% |
| Temporarily hold administration of the enteral nutrition formula during medication administration ^{a,b} | 106 | 37 | 34.9% |
| Hold the feeding by 30min or more when separation is indicated ^a | 4 | 4 | 100.0% |
| Do not add medication directly to an enteral feeding formula ^{a,b} | 268 | 0 | 0.0% |

* Percentage calculated on n_{relevant}

^a Bankhead et al. (2009)

^b White & Bradnam (2007)

When comparing our observations of medication administration with guidelines, we found that not flushing the EFT with at least 15mL water before and after drug administration, not using a syringe of ≥ 30 mL in size for drug administration, not elevating the resident's backrest $\geq 30^\circ$, and not rinsing the medicine cup were the most common deviations. For most observations flushing between drug administrations was not applicable since all drugs administered at one administration moment were mixed together as a cocktail. The guideline stating that the EFT needs to be flushed with at least 15mL water before, between and after medication administration, was not followed in most cases; respectively in 98.9% (265/268), 98.8% (82/83), and 33.6% (90/268) of administrations. However, it is relevant to note that in some of these cases, the EFT was flushed with less than 15mL water before, between or after medication administration; respectively in 3.7% (10/268), 14.5% (12/83), and 10.4% (28/268) of the observations. We also noticed that in one RCF, EFTs were consistently flushed with cola. In all residents, at least one deviation from medication administration guidelines was observed.

Table 3 Resident characteristics

| <i>Resident characteristics</i> | <i>n=48</i> |
|--|--------------------|
| Age (years), median (range) | 15.0 (3-62) |
| Male sex | 22 |
| Weight (kg), mean (SD) | 34.7 (13.5) |
| Grade of ID | |
| Severe (IQ 20-39) | 2 |
| Profound (IQ<20) | 46 |
| Tube type | |
| Gastrostomy | 47 |
| Jejunostomy | 1 |
| Tube size | |
| 10 French | 4 |
| 14 French | 22 |
| 15 French | 4 |
| 16 French | 5 |
| 18 French | 5 |
| Size unknown | 8 |
| Type of feeding regimen | |
| Continuous | 0 |
| Cyclic | 6 |
| Intermittent | 34 |
| Bolus | 4 |
| No enteral feeding | 4 |
| Number of drugs via EFT per resident, median (range) | 6.0 (1-14) |
| Number of administration moments per day | |
| 1 | 1 |
| 2 | 3 |
| 3 | 25 |
| 4 | 12 |
| 5 | 2 |
| 6 | 4 |
| 7 | 1 |

Data are presented as n, unless indicated otherwise.

ID, intellectual disability; EFT, enteral feeding tube

Table 4 Galenic form of the prepared medications (n=862)

| | | <i>n</i> | <i>(%)</i> |
|--------|-----------------|----------|------------|
| Solid | Tablets | 295 | (34.2) |
| | Non-dispersible | | |
| | Crushable | 211 | (24.5) |
| | Non-crushable * | 15 | (1.7) |
| | Dispersible | 69 | (8.0) |
| | Capsules | 134 | (15.5) |
| | Openable | 134 | (15.5) |
| | Non-openable | 0 | (0.0) |
| Liquid | Powder/granules | 41 | (4.8) |
| | Solutions | 265 | (30.7) |
| | Suspensions | 124 | (14.4) |
| | Emulsions | 3 | (0.3) |

* That is, sustained release formulations in all cases, and enteric coated formulations for administration through gastrostomy.

Table 5 Top 10 most frequently prepared drugs (n=862)

| ATC Code | Drug name | <i>n</i> | <i>(%)</i> |
|----------|---------------|----------|------------|
| N03AG01 | Valproic acid | 121 | (14.0) |
| M03BX01 | Baclofen | 70 | (8.1) |
| N03AX14 | Levetiracetam | 58 | (6.7) |
| N03AX09 | Lamotrigine | 48 | (5.6) |
| A02BC01 | Omeprazole | 47 | (5.5) |
| N03AE01 | Clonazepam | 28 | (3.2) |
| A02BX13 | Alginic acid | 27 | (3.1) |
| A03FA03 | Domperidone | 26 | (3.0) |
| N03AA02 | Phenobarbital | 25 | (2.9) |
| N05BA09 | Clobazam | 23 | (2.7) |

ATC, Anatomical Therapeutic Chemical classification system.

DISCUSSION

Main findings

This cross-sectional observational study found that current guidelines concerning medication preparation and administration through EFT are often not followed in Belgian RCFs for individuals with ID.

Regarding medication preparation, **mixing together two or more drugs** was the most frequent deviation from guidelines (observed in about 2/3 of prepared medication). Whether mixing together different medications actually results in physicochemical incompatibilities should be studied

experimentally case-by-case as this depends on various factors (i.e. the physicochemical properties of the active ingredients as well as the excipients). Incompatibility is thus difficult to predict ³, and therefore guidelines recommend to avoid mixing medications. The second most frequent deviation from guidelines was **not diluting liquid medication** (observed in about half of liquid medication), which is recommended to reduce viscosity, and, consequently, the resistance to flow through an EFT ^{3;24}. For example for liquid dosage forms of carbamazepine and phenytoin, it has been shown that dilution prior to administration is associated with improved delivery of the drug dose to the distal end of the tube ^{27;28}. Another common deviation from guidelines was **not shaking suspensions/emulsions** before use (observed in about half of prepared suspensions/emulsions). This leads to a high variability in the doses administered, and consequently to underdosing and therapeutic failure on one occasion, and overdosing and potential toxicity on another ²⁹. This was demonstrated by an experimental study of the consequences of not shaking an amoxicillin suspension, which revealed manifest dosing errors (e.g. doses <10% of the labeled content) ²⁹. In our sample, the unshaken suspensions contained the antibiotics azithromycin, ciprofloxacin, trimethoprim-sulfamethoxazole and the antiepileptic drug carbamazepine. It seems likely that not shaking these formulations will have clinical consequences for the patient. Additionally, although not occurring frequently, we observed **crushing of modified-release dosage forms** (i.e. sustained release formulations for administration through gastrostomy as well as jejunostomy, and enteric coated formulations for administration through gastrostomy). In our sample, crushed sustained release formulations contained valproic acid and carbamazepine. Crushed enteric coated formulations contained proton pump inhibitors (PPI) (es)omeprazole and pantoprazole. PPIs are known to be very acid labile molecules, e.g. the degradation half-life of omeprazole is <2 minutes at pH2 ³⁰. Treatment failure due to crushing omeprazole has been reported ³¹.

Regarding medication administration, **not flushing** the EFT with at least 15mL water (before, between and after medication administration) was a frequent deviation from guidelines. Flushing of the EFT is recommended in order to prevent tube blockage, to avoid possible physicochemical interactions, and to prolong the life of the EFT ³. One RCF in our sample consistently flushed with cola instead of water (the preferred flushing solution ^{2;3;32}). Cola is an acidic fluid and can cause or exacerbate EFT occlusions by causing feed to coagulate or protein to denature ².

Notwithstanding guidelines are often not followed, also **good practice** was observed. During drug preparation, in the majority of the observations solid medication was diluted with at least 10mL water, the most suitable drug formulation was chosen, and hard gelatin capsules were opened and contents were mixed with water. Regarding medication administration, medication was never added directly to an enteral feeding formula, and tubes were mostly flushed with the preferred flushing solution water.

Another important finding is the high **variability** in working methods regarding medication preparation and administration via EFT, even between staff members of the same unit. This is consonant with our previous study on the entire medication management process, where a large variation in procedures was identified between the participating RCFs (n=34), and even between units within the same RCF ¹⁹.

Comparison with literature and possible strategies to improve guideline adherence

To the best of our knowledge, only the study of *Idzinga et al.* focused on medication administration through EFT in an **RCF for individuals with ID**. They described that preparation errors occurred in 37% of (baseline) observations, and also identified not flushing the EFT as the main administration error, although this deviation occurred less frequently than in our observations (in respectively 2%, 11%, and 1% of observations, EFTs were not flushed before, between and after medication administration) ¹⁰. *Idzinga et al.* also evaluated an intervention program that addressed these issues, and included communicating to the pharmacist which clients have EFT, advice on medication administration via EFT by the pharmacist, a ‘medication through tube’ box, and training sessions. This program was found to be effective, although the proportion of administration errors after the intervention was still considered high.

The results of our study are also in line with previous research in the **hospital setting** ^{12;13;16;17;33}, where mixing together medications, crushing of sustained release formulations, and not flushing the EFT were reported. Reported percentages of mixing together medications range from 38% to 98% of the observations ^{12;16;17}, whereas crushing of sustained release formulations for administration through the EFT ranges from 3% to 5% of the observations ^{12;16}. Concerning the issue of flushing the EFT, mainly flushing before (not flushed in 11%-100% of observations ^{12;16;17}) and between (not flushed in 100% of observations ^{12;16}) drug administrations was not performed in the hospital setting ^{12;13;16;17}. Intervention programs in this setting have shown to be effective in improving medication administration through EFT. The intervention in the study of *van den Bemt et al.* ¹⁷ consisted of daily ward visits by pharmacy technicians, introducing working instructions, and “enteral feeding tube” and “do not crush” indications. It resulted in a decrease in the number of tube obstructions and to a significant decrease in the number of administration errors per nurse. *Dashti-Khavidaki et al.* ¹⁸ found that an integrated educational program (i.a. booklet on administration technique/dosage forms, training session, and detailed working instruction) significantly improved knowledge and practice of nurses. Medication errors in the intervention group decreased from 43 % pre-intervention to 27 % post-intervention.

Strengths and limitations

To our knowledge, this is the first study describing in detail medication administration via EFT in multiple RCFs. However, our study also had some limitations. Main limitation is that we did not assess whether the observed guideline deviations actually caused patient harm, such as patient morbidity

and/or mortality. However, in view of the relatively low incidence of these effects, a much larger sample size would be needed, which was beyond the scope of our study. Another limitation is the concern about the unexpected and unexplained reactivity to the observations of the staff members who are aware of their participation in a study, also known as the Hawthorne effect ³⁴. However, concern that observers would make the observed staff member more careful (preventing errors and thus underestimating deviations) or more nervous (leading to more mistakes) seems unfounded when they are doing an activity familiar to them ^{22;35}. Finally, because of the time consuming nature of the observation method, observations were limited to two workdays (from 6 am to 9 pm), and drug administrations at nighttime or during the weekend were not observed. As staffing is lower during weekends and nights, frequency of guideline deviations may therefore even be underestimated.

Implications for practice and future research

Our observations demonstrate the need for practical, unequivocal recommendations and education programs on the administration of drugs via EFT in this setting. For example, the inappropriate crushing in our study may have been avoided if the delivering pharmacist had known which residents receive their medication through EFT, combined with the development and implementation of clear and practical local guidelines in each RCF, and training sessions for staff members. This type of training could reduce inappropriate crushing, as already demonstrated in an intervention study in nursing homes ³⁶. However, before implementing an intervention program, further research is needed to better understand why current guidelines are not followed by staff members of RCFs for individuals with ID. According to *Idzinga et al.*, the small effect of the intervention on the EFT related preparation errors could partly be explained by the lack of information provided by the pharmacy (only part of the medication on the administration record was accompanied by a pharmacy advice on the correct mode of administration), and partly by the nurse attendants not following up on the pharmacy advices ¹⁰. In order to know exactly what the reasons are for not following guidelines, qualitative research in this area is needed. Based on this knowledge, an appropriate intervention with unequivocal, practicable guidelines can be set up and implemented in order to improve medication administration through EFT in individuals with ID.

CONCLUSION

This study found that current guidelines concerning medication preparation and administration through EFT are often not followed in Belgian RCFs for individuals with ID. Further research aimed at understanding why current guidelines are not followed seems warranted.

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Chapter 4: DRUG USE AND POTENTIAL DRUG-DRUG INTERACTIONS IN INSTITUTIONALIZED INDIVIDUALS WITH INTELLECTUAL DISABILITY AND TUBE FEEDING

This chapter is submitted as:

Joos E, Mehuys E, Remon JP, Van Winckel M, Boussery K. Analysis of drug use in institutionalized individuals with intellectual disability and tube feeding. Submitted to *Acta Clinica Belgica*, under review (May 2015)

ABSTRACT

Objectives: Little is known about the medication used by people with intellectual disabilities (ID) and enteral feeding tube (EFT). However, in light of the complexity associated with drug administration through EFT, data on medication use in this population may be helpful in the development of practical guidelines and staff training initiatives.

Methods: A cross-sectional, observational study was conducted in six Belgian residential care facilities (RCFs) for individuals with ID. Anonymized medication records of all residents receiving chronic medication through EFT were collected (n=156). All chronic drugs were categorized according to the ATC classification, and medication records were checked for potential major drug-drug interactions (DDI).

Results: The 156 residents used a total of 1029 chronic drugs via EFT, with a median of six drugs per resident (range 1-14). A total of 148 different drug molecules were identified, belonging to 38 main ATC therapeutic groups (ATC level 2). Antiepileptics, drugs for constipation, and drugs for acid related disorders were the most frequently used groups. Seventy-four of the 156 screened medication records (47%) contained at least one potential major DDI; in total, 116 potential interactions were identified, which represent 38 different interacting drug pairs.

Conclusion: This study describes medication use through EFT among people with ID in Belgian RCFs, with antiepileptics being the most frequently used group. Our study also demonstrated that a high number of drugs is administered through EFT, and that the number of potential DDIs is high. These observations warrant an increased attention for drug use in individuals with ID and EFT.

Keywords: drug use, enteral feeding tube, intellectual disability, residential care facility, medication administration, drug interaction

INTRODUCTION

People with intellectual disabilities (ID) have more health problems, e.g. epilepsy, sensory loss, constipation and psychotic disorders, than people without ID ¹⁻³. As a consequence, medication use in this population is high ². However, due to feeding problems, people with ID, especially those with severe/profound ID ^{4;5}, often depend on an enteral feeding tube (EFT) for both feeding and the administration of drugs. To the best of our knowledge, studies describing medication use by people with ID and EFT are lacking. However, in light of the complexity associated with drug administration through EFT ^{5;6}, data on medication use in this population may support the development of practical guidelines for drug administration to these vulnerable patients and the development of staff training initiatives. Therefore, the present study aimed to draw up an inventory of drugs that are routinely administered through EFT in people with ID in Belgian residential care facilities (RCF), as well as to check for potential pharmacokinetic/pharmacodynamic drug-drug interactions (DDI).

METHODS

Study design and setting

This study was conducted from March to June 2012 in RCFs for individuals with an ID in Belgium. We approached six randomly selected RCFs with at least 10 residents with ID and EFT. All six agreed to participate. The RCFs included in this study are relatively large campus-style accommodations. They offer (semi-) residential care to people with mild to profound ID (often associated with other disabilities), who cannot be cared for at home. These RCFs provide medical, pedagogic, psychological and social services, and are often linked to special schools. Approval for the study was granted by the local Ethical Committee.

Data collection and analysis

We collected anonymized medication records of all residents receiving chronic medication through EFT, as well as the residents' main characteristics (sex, age, grade of ID, and type of EFT). All chronic medications administered through EFT were categorized according to the Anatomical Therapeutic Chemical (ATC) classification system developed by the WHO ⁷.

We also checked all medication records for potential major DDIs between chronic drugs. The DelphiCare® database (=database provided by the Belgian Pharmacists Association, which is a translation of the German ABDDATA interaction database ⁸, adapted to the Belgian drug market) was used to screen for potential DDIs. It classifies DDIs as A (formally contraindicated), B (formally

contraindicated in specific cases only), C (contraindicated by precaution), D (concurrent use not recommended), E (patient monitoring or adaptation of drug regimen required), F (patient monitoring or adaptation of drug regimen required in specific cases only), or in the minor categories G (proceed with caution) and H (no measures needed). DDIs from the more severe classes (A to E) were independently evaluated by two pharmacists (EJ and EM) using Stockley's Drug Interactions (10th edition)⁹ and Lexi-Interact¹⁰. A general conclusion for patient management was drawn, and classified as (1) no action required, (2) patient monitoring without lab results, (3) patient monitoring with lab results, (4) dose modification, (5) therapy modification, and (6) time interval between administration of the interacting drugs. In case of combination of QT-prolonging medications, the CredibleMeds® website¹¹ was consulted as additional source.

RESULTS

This study was performed at six randomly selected RCFs, and included 156 residents with EFT. The main characteristics of the residents are displayed in Table 1. Ninety-four percent (147/156) had a gastrostomy tube.

Table 1 Resident characteristics (n=156)

| <i>Resident characteristics</i> | <i>n=156</i> |
|---|---------------------|
| Age (years), median (range) | 20 (2-80) |
| Male sex | 64 |
| Grade of intellectual disability (ID) | |
| Light ID | 1 |
| Moderate ID | 7 |
| Severe ID | 4 |
| Profound ID | 144 |
| Tube type | |
| Gastrostomy | 147 |
| Jejunostomy | 6 |
| Gastrostomy & jejunostomy | 2 |
| Nasogastric | 1 |
| Number of chronic drugs via EFT per resident, median (range) | 6 (1-14) |

Data are presented as n, unless indicated otherwise.

Medication use

The 156 residents used a total of 1029 chronic drugs via EFT, with a median of six drugs per resident (range 1-14). One percent of the residents (2/156) used 1 chronic drug, 32% (51/156) used 2 to 5 chronic drugs, 52% (81/156) 6 to 9 drugs, and 14% (22/156) more than 9 drugs (max 14). A total of 148 different drug molecules, belonging to 38 main ATC therapeutic groups (ATC level 2) were used in our patient sample.

The most frequently administered drug molecules (ATC level 5) are listed in Table 2, whereas Table 3 lists the most frequently used drug classes (ATC level 2).

Table 2 Most frequently used chronic drugs through enteral feeding tube

| ATC Code | Drug name | % of total number of chronic drugs (n=1029) | % of study population using this drug (n=156) |
|----------|-------------------------|---|---|
| N03AG01 | Valproic acid | 7.5 | 49.4 |
| A06AD65 | Macrogol, combinations | 7.5 | 48.1 |
| A02BC01 | Omeprazole | 6.5 | 42.9 |
| A11CC05 | Colecalciferol (vit.D3) | 4.1 | 26.9 |
| N03AX14 | Levetiracetam | 3.1 | 20.5 |
| N03AA02 | Phenobarbital | 3.0 | 19.9 |
| N03AX11 | Topiramate | 3.0 | 19.2 |
| N03AF01 | Carbamazepine | 2.5 | 16.7 |
| N03AE01 | Clonazepam | 2.4 | 16.0 |
| A06AD11 | Lactulose | 2.4 | 15.4 |

ATC = Anatomical Therapeutic Chemical

Within the group of antiepileptic users, 28% used one antiepileptic, 27% used two different antiepileptics, 15% three, and 8% used even more different antiepileptics (max. 6). Residents taking drugs for constipation or taking psycholeptics used one to three different compounds within each class, whereas for acid related disorders maximum two different compounds of ATC-class A02 were used by the same patient.

Table 3 Most frequently used chronic drug classes through enteral feeding tube (classified according to ATC level 2), and the 3 most occurring drugs for the first 4 drug classes

| ATC Code | ATC Class Name | % of total number of chronic drugs (n=1029) | % of study population using this drug (n=156) |
|----------|---|---|---|
| N03 | Antiepileptics ^a | 28.0 | 78.2 |
| A06 | Drugs for constipation ^b | 14.3 | 75.0 |
| A02 | Drugs for acid related disorders ^c | 12.5 | 73.7 |
| N05 | Psycholeptics ^d | 7.1 | 38.5 |
| A11 | Vitamins | 5.2 | 32.7 |
| A12 | Mineral supplements | 4.0 | 25.0 |
| M03 | Muscle relaxants | 4.0 | 25.0 |
| A03 | Drugs for functional gastrointestinal disorders | 4.0 | 24.4 |
| J01 | Antibacterials for systemic use | 3.4 | 20.5 |
| G03 | Sex hormones and modulators of the genital system | 2.1 | 14.1 |

ATC = Anatomical Therapeutic Chemical

^a Valproic acid (n=77), levetiracetam (n=32), phenobarbital (n=31)

^b Macrogol combinations (n=77), lactulose (n=24), sorbitol (n=21)

^c Omeprazole (n=67), esomeprazole (n=19), ranitidine (n=14)

^d Clobazam (n=16), diazepam (n=12), nitrazepam (n=10)

Drug-drug interactions

Seventy-four of the 156 screened medication records (47%) were found to contain at least one potential DDI (class A-E). In total, 116 interactions were identified, which represent 38 different interacting drug pairs, all ranked as class E DDIs ('patient monitoring or adaptation of drug regimen required'). Table 4 shows the five most frequently occurring DDIs. Regarding the general conclusion for patient management, of the 38 different DDIs 5 were classified as 'no action required', 10 as 'patient monitoring without lab results', 4 as 'patient monitoring with lab results', 3 as 'dose modification', 6 as 'therapy modification', and 9 as 'time interval between administration of the interacting drugs'. The interaction mechanism was mostly pharmacokinetic (27/38, 71%), more specifically at the level of absorption (n=9) or metabolism (n=18). Pharmacodynamic interactions occurred in 8 DDIs (21%), while the remaining cases were classified as either both pharmacokinetic and pharmacodynamic (2/38), or with an unclear interaction mechanism (1/38).

Table 4 Top 5 most frequently occurring drug interaction pairs, and their patient management

| Interacting drug pair | | Occurrence (n _{tot} =116) | | Patient management |
|-----------------------|-----------------------------|------------------------------------|------------|---|
| | | Frequency | Percentage | |
| ATC codes | Drug names | (n) | (%) | |
| N03AX11+N03AG01 | Topiramate+Valproic acid | 16 | 14% | Patient monitoring without lab results ¹ |
| N03AX09+N03AG01 | Lamotrigine+Valproic acid | 15 | 13% | Dose modification ² |
| N03AE01+N03AG01 | Clonazepam+Valproic acid | 14 | 12% | Patient monitoring without lab results ³ |
| N03AA02+N03AG01 | Phenobarbital+Valproic acid | 10 | 9% | Patient monitoring with lab results ⁴ |
| N05BA09+N03AG01 | Clobazam+Valproic acid | 7 | 6% | Patient monitoring with lab results ⁵ |

¹ Monitor for the development of adverse reactions (including encephalopathy)

² Decrease the dose of lamotrigine by 50% when used concomitant with valproic acid

³ Monitor for potentially clinically significant effects (sedation, absence seizures)

⁴ Monitor for increased serum concentrations/toxic effects of barbiturates if valproic acid or other valproate products are initiated/dose increased, or decreased serum concentrations/effects if valproic acid or other valproate products are discontinued/dose decreased. Dose adjustments may be necessary.

⁵ Monitor for any increase in the valproate serum concentrations

DISCUSSION

In this study, we have investigated medication use among people with ID who depend on EFT for drug administration. We found that in half of this patient population, more than six different drugs are administered through the EFT. This high number of drugs not only contributes to medication administration in RCFs being labour-intensive, it has also been associated with a higher risk for medication errors ¹², and a higher risk for drug-related problems such as DDIs ¹³. The latter is demonstrated by the large proportion of potential DDIs in our study. DDIs are a known cause of unfavorable clinical outcomes ¹⁴. Therefore, active screening for and management of DDIs is recommended ¹⁴. Previous research has shown that systematically reviewing medical records by clinical pharmacists could play an important role in identifying DDIs in elderly patients ^{15;16}. The elderly are at risk for experiencing adverse drug events because of their medical complexity, fragility, and common exposure to polypharmacy ^{13;17;18}. Many of these characteristics are shared by individuals with ID. Therefore, the integration of pharmacists in an interdisciplinary care model within the RCF may be a useful strategy in the prevention of potentially severe DDIs. In order to further enhance drug use in individuals with ID living in RCFs, this screening for DDIs should be part of a regular drug therapy review. A first step in this review could consist of determining the therapeutic rationale for the prescription, and to discuss discontinuation of any therapy for which this cannot be identified or for which duration of therapy is inappropriate. Also, evaluation of adverse drug reactions and correct dose could be

included. Further, it should be determined which of the drugs need to be administered via EFT or whether the patient can still take them orally. The use of alternative routes of administration should be fully explored, but the practical considerations should be borne in mind at all times and should be offset against using a drug outside the terms of its product license. During review of the patient's therapy several other factors must be taken into account to minimize the likelihood of complications, such as the length of the patient's functional bowel, the internal diameter and length of the tube, the composition of the tube, the location of the distal end of the EFT relative to the site of drug absorption, the size of the distal opening(s), as well as the routine flushing regimen, the possible effect of the feeding formula on drug absorption, and the need to keep a drug separate from a tube feeding formula⁵.

Our study identified antiepileptics, drugs for constipation, and drugs for acid related disorders as the three most frequently used drug classes, which is in line with the most frequently prescribed drug classes found by *van der Heide et al.* in their sample of institutionalized residents with profound ID and profound or severe motor disorders¹⁹. These classes however, require special attention in case of administration through EFT. First, antiepileptics are known to have a relatively narrow therapeutic index, to be responsible for a wide variety of clinically important adverse effects²⁰, and to be involved in many drug interactions²¹⁻²⁴. Also in our study sample, antiepileptics are involved in the 5 most frequently occurring potential DDIs (cfr. Table 4). Second, drugs for constipation need to be dissolved in, or –because of their viscosity– diluted with a large volume of water (e.g. macrogol, lactulose) in order to avoid tube blockage⁵. Third, proton pump inhibitors require special attention when preparing for intragastric administration since these drugs are acid-labile and undergo gastric degradation⁵.

Thus, medication use in this vulnerable patient population holds –in combination with the need to administer drugs through EFT– a risk for drug-related problems. However, our previous study on the medication management process (MMP) in RCFs for people with ID revealed that the MMP in Belgian RCFs for people with ID is suboptimal, both at policy level and at unit level²⁵.

This study has some limitations. We did not gather data on patient conditions or laboratory values, so we could not take these factors into account when evaluating clinical relevance of the DDIs, nor did we discuss our findings with the RCF's physician, hence we do not know whether the suggested patient management was already taken into account at initiation of the drug combination. However, it was the aim of our study to draw up an inventory of drugs used through EFT, as well as checking for potential DDIs among the most commonly used drugs.

Notwithstanding these limitations, the data of this study can be useful in developing training initiatives for all health care workers active in RCFs. Since medication is mostly administered by non-medically

educated staff members (e.g. care takers) ²⁵, this group should receive training on those drugs and drug classes commonly used through EFT, tailored to their educational level and focusing on correct modes of administration. Also potential risks related to the drugs commonly used in this setting should be emphasized during training initiatives for staff members of the medical office (nurses and physicians) and for pharmacists dispensing drugs to RCFs. In this study, we identified potential major drug-drug interactions and elaborated a framework for conclusions for patient management, which could serve as a base for future discussion of DDIs with prescribers.

CONCLUSION

This study described medication use through EFT among people with ID in Belgian RCFs, with antiepileptics, drugs for constipation, and drugs for acid related disorders being the most frequently used classes. Our study also demonstrated that a high number of drugs is administered through EFT in this population, and that the number of potential DDIs is high. These observations warrant an increased attention for drug administration through the EFT in individuals with ID.

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Chapter 5: DRUG ADMINISTRATION VIA ENTERAL FEEDING TUBE IN RESIDENTIAL CARE FACILITIES FOR INDIVIDUALS WITH INTELLECTUAL DISABILITY: A FOCUS GROUP STUDY ON GUIDELINE IMPLEMENTATION

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ABSTRACT

Introduction: People with profound intellectual disabilities (ID) and oral motor dysfunction often receive medication through an enteral feeding tube (EFT). In a previous study we found that current guidelines concerning medication preparation and administration through EFT are often not followed in residential care facilities (RCFs) for individuals with ID. The present study aimed to identify barriers and facilitators experienced by RCF-staff members to following guidelines on medication administration via EFT.

Method: We conducted a qualitative study in Belgian RCFs for individuals with an ID, using focus groups with staff members who administer medication via EFT. A total of four focus group interviews, each with six staff members, were conducted. Vignettes were used to guide discussion. A thematic analysis was performed on the obtained data.

Results: Time constraints, lack of knowledge, lack of clear administration instructions, lack of necessary materials, and limited gastric fluid tolerance in certain residents were identified as barriers to following guidelines. Other influencing factors emerging from the interviews were the number of staff members involved in medication handling, the number of residents and number of drugs to be administered, habits, the residents' comfort and well-being, and safety.

Conclusion: Our study identified a number of perceived barriers and facilitators to following guidelines concerning medication administration through EFT. In order to optimize care for this vulnerable patient population with EFT, an intervention can be set up based on these findings. The intervention should focus on improving staff members' medication-related knowledge, and providing clear administration instructions and the necessary materials.

Keywords: barrier, enteral feeding tube, focus group, intellectual disability, medication administration

INTRODUCTION

People with intellectual disability frequently present with feeding problems (limited feeding skills, oral motor dysfunction and increased aspiration risk), especially those with severe/profound intellectual disabilities ¹. Therefore, both food and medication are often administered through an enteral feeding tube (EFT) ². However, administration of oral medication via EFT is challenging and complex, and poses a risk of tube obstruction, reduced drug effectiveness, and increased drug toxicity ². The unwanted and often unforeseen risks with drug administration through the EFT, can lead to patient harm or even death ³. To reduce these risks, guidelines for the administration of medication through EFT have been issued. These include careful selection and preparation of appropriate dosage forms, withholding feeding during drug administration, separate administration of drug doses and adequate flushing of the EFT ^{2,4}. Yet, in a previous study we found that these guidelines are often not followed in residential care facilities (RCFs) for individuals with an intellectual disability ⁵.

It has been reported that insight into the possible barriers to adherence to guidelines may facilitate the implementation of guidelines in clinical practice, and may therefore contribute to an improved quality of care ⁶. Barriers to safe medication practices have been studied before. In the mental health setting, Hemingway et al. (2014) identified environmental distractions (e.g. telephone), insufficient pharmacological knowledge, poorly written and incomplete medication documentation, and work-related pressure to be seen as barriers to safe medication administration practices by registered and student mental health nurses ⁷. Among the contributory factors to nursing medication errors in the hospital setting, deviations from procedures, including distractions during administration, excessive workloads, and nurse's knowledge of medications, were mentioned in a literature review of Brady et al. ⁸. In the nursing home sector, Dilles et al. (2011) studied the barriers nurses experience to safe medication management. Barriers were related to the nurse, organization, interdisciplinary cooperation, or to the patient and family. Regarding medication preparation, administration and monitoring, being interrupted, not knowing enough on interactions, and barriers in interdisciplinary cooperation caused the most hindrance ⁹. However, to the best of our knowledge, no study has ever focused on the barriers to safe medication practices in the setting of RCFs for people with an intellectual disability. Since especially drug administration through EFT seems to be both error-prone ¹⁰ and common practice in many RCFs for people with an intellectual disability ⁵, we specifically aimed to identify barriers and facilitators experienced by RCF-staff members to following guidelines on medication administration via EFT.

METHODS

Study design and participant recruitment

We used focus groups to explore the perceived barriers and facilitators to following current guidelines regarding medication administration via EFT. Focus groups were held between December 2013 and February 2014. Targeted study participants were staff members of Belgian RCFs for individuals with intellectual disabilities, who actually administer medication via EFT. The organization of RCFs in Belgium is described in Table 1. We randomly approached RCFs with at least 10 residents with EFT, that had already participated in our previous observational study concerning medication administration via EFT⁵. First, the RCF director was asked for consent to taking part in the study. Next, all included RCFs provided us with a list of staff members (administering medication via EFT) who were present at the (pre-set) time of the interview. Out of this list, the research team randomly selected six staff members per focus group. These potential participants received an information letter and informed consent form at least one week before the interview, and were offered the opportunity to opt out of the study by e-mail. If a staff member did not want to participate, the research team randomly selected another eligible staff member. Focus groups were held per RCF for practical reasons and in order to avoid a focus on the differences in current working methods between RCFs instead of on the adherence to guidelines. Approval for the study was granted by the local Ethical Committee. All directors of the participating RCFs and all interviewed staff members gave written informed consent.

Table 1 Background information on the residential care facilities (RCF) included in this study

The RCFs included in this study are relatively large campus-style accommodations. They offer (semi-) residential care to people with mild to profound ID (often associated with other disabilities), who cannot be cared for at home. These RCFs provide medical, pedagogic, psychological and social services, and are often linked to special schools. They are run by private not for profit organizations, and get their subsidies from the “Vlaams Agentschap voor Personen met een Handicap” (Flemish Agency for People with a Disability) that falls within the authority of the Flemish governmental agency for welfare. A typical RCF in Flanders consists of a medical office and several units. The medical office is a physical location within the RCF where all medical records are centralized, and where the practical aspects of the medication management process (such as ordering, storage, distribution of medication) are generally coordinated. The medical office is staffed by nurses and/or physicians. A unit is a living group of approximately 10 residents, where daily care and support is provided by educators (i.e. staff with bachelor degree in orthopedagogics) and/or caretakers and/or nurses. Nonmedically trained staff members (e.g., educators) are often responsible for the preparation and administration of medication in the RCFs²⁴.

Data collection

Participant demographic (age, gender, completed educational qualifications) and work experience data (years of experience in the sector of intellectual disability, and years of experience with medication administration via EFT) were collected prior to the focus group interviews. Participants were also asked to rate their self-perceived level of knowledge on medication administration via EFT on a scale of 0 (= no knowledge) to 10 (= excellent knowledge). Focus group interviews took place in the RCF of the participating staff members.

To facilitate discussion, we developed four written vignettes ¹¹⁻¹³. Each vignette included a real practice situation derived from our previous observational study describing deviations from guidelines in daily practice ⁵, together with a proposal for a new administration procedure. This proposed procedure concretely describes medication preparation and/or administration according to current guidelines (e.g. how to prepare gelatin capsules for administration through EFT). The A.S.P.E.N. guidelines ² and the Handbook of Drug Administration via Enteral Feeding Tubes by ¹⁴ were selected as guideline standards by an expert panel of three pharmacists ⁵. The A.S.P.E.N. guidelines classified each recommendation according to the available evidence. Majority of the guidelines applied in the vignettes, were attributed grade A by A.S.P.E.N., meaning there is good research-based evidence to support the guideline. Table 2 presents the guidelines included in the vignettes.

The barriers and facilitators to complying with current guidelines were then discussed on the basis of the following key questions: (i) what parts of the altered working procedure complying with the guidelines could be implemented in daily practice, (ii) what parts are difficult or impossible to implement, and why, and (iii) what would be needed to facilitate the implementation of the issues raised under (ii). EJ, a pharmacist trained in conducting focus groups, moderated all focus groups. IVT, a pharmacist experienced in assisting focus group interviews, observed non-verbal interaction and summarized the discussion for all conducted interviews. The vignettes were a starting point to discuss particular guidelines. After reading aloud each vignette, the moderator initiated discussion using the key questions. The moderator only intervened when discussion shifted off topic or when something needed to be elucidated. After the focus groups, moderator and observer had a debriefing on the process and content of the focus groups. The focus groups were audio recorded and transcribed verbatim. We held 4 focus groups with 24 staff members (6 per focus group), after which saturation of data was reached. Participant characteristics can be found in Table 3. Participants were all female, and majority had non-nursing educational background. Each focus group interview lasted between 60 and 90 minutes.

Table 2 Guideline recommendations incorporated in the vignettes

| Guidelines incorporated in the vignettes |
|---|
| <i>Vignette 1</i> |
| Do not crush tablets together |
| Avoid mixing together medications |
| Before medication administration, flush with at least 15mL water |
| Between drugs, flush with at least 15mL water |
| After medication administration, flush with at least 15mL water |
| Temporarily hold administration of the enteral nutrition formula during medication administration |
| <i>Vignette 2</i> |
| Shake liquid medication thoroughly before use |
| Dilute liquid medication with at least an equal amount of water |
| <i>Vignette 3</i> |
| Open hard gelatin capsules (if allowed) and mix contents with water |
| If used, ensure that the medicine cup is rinsed with water |
| <i>Vignette 4</i> |
| Use protective equipment when crushing drugs like hormones or antibiotics |

Table 3 Characteristics of the focus group participants (n=24)

| Participant characteristics | n=24 |
|--|--------------|
| Age (years), median (range) | 32.5 (20-54) |
| Female | 24 |
| Completed educational qualifications | |
| Nurse | 3 |
| Educator | 16 |
| Other | 5 |
| Years of experience in the sector of intellectual disability, median (range) | 8.5 (0.5-32) |
| Years of experience with medication administration via EFT, median (range) | 5.0 (0.1-25) |
| Self-perceived knowledge of medication administration via EFT on a visual 0-10 scale, median (range) | 7 (5-9) |
| Data are presented as n, unless indicated otherwise. | |
| EFT enteral feeding tube | |

Data analysis

A thematic analysis was performed by two of the authors (EJ and IVT) independently from each other. Nvivo 10⁷ was used to manage, code and analyze the data. Preliminary analysis involved open coding to generate a range of codes that emerged from the data. Codes reflected the discussed current guidelines and themes. Descriptive codes, their meaning and coded excerpts of data were then compared in order to reach agreement on the meaning of codes. When relationships between codes became clear, these were grouped under broader categories and hierarchical and non-hierarchical relationships were defined. New data often led to new codes or to the refining and redefinition of existing codes, categories and relationships. This iterative process of indexing, coding, categorizing and discussions between researchers was repeated several times. Throughout this process coding queries and coding comparison queries were used. Also member checks were carried out with the participating staff members to ensure that the interview transcripts were accurate and true to their experiences.

RESULTS

A wide range of influencing factors emerged from the focus group interviews (Table 4).

Table 4 Emergent themes and subthemes regarding medication administration through EFT

| |
|---|
| <i>1) Time constraints</i> |
| Time-consuming/Labor-intensive |
| Number of staff members present |
| Number of residents with EFT |
| Number of drugs per resident |
| <i>2) Knowledge of guidelines & clear administration instructions</i> |
| Low medication-related knowledge |
| Not being aware of the rationale behind the guidelines |
| Lack of clear administration instructions |
| <i>3) Habits</i> |
| Difficulty of changing habits |
| Willingness to change |
| <i>4) Lack of necessary materials & practical issues</i> |
| Insufficient or no proper material |
| Material costs |
| Manipulation of medication more difficult |
| <i>5) Limited gastric fluid tolerance of some residents</i> |
| <i>6) Comfort & safety of the resident</i> |
| Discomfort for the resident |
| Improved well-being of the resident |
| Control |

Time constraints

Time constraints were frequently mentioned as an important barrier to following guidelines. Participants regarded several guideline recommendations as being time consuming and labor-intensive, in particular the recommendation to avoid mixing together medications. Some participants however, believed that adherence to guideline recommendations such as shaking liquid medication, opening gelatin capsules, stopping enteral feeding, and flushing the EFT would not need extra time. Related to time constraints, the number of staff members present at the moment of medication administration plays an important role. In particular the guideline recommendations concerning not mixing medications, and flushing before, between and after medication administration were mentioned as impossible to adhere to if only one staff member is present at the unit (i.e. a group of approximately 10 residents, where daily care and support is provided by educators and/or caretakers and/or nurses). Participants reported the presence of one staff member focusing on medication preparation and administration per shift as a potential facilitator for safe medication handling.

P1: And if you have to do all of this when you're alone, and you need to give the medication, and you have to do that. Yes, then... you cannot do all this.

M: Is there anything that comes to your mind that would facilitate this working procedure?

P20: An extra staff member specially for medication administration. (...) P19: A nurse.

The number of residents and the number of drugs per resident were also reported to influence whether guidelines could be followed in daily practice.

P9: And also practically. If you have 8 residents, and you need to administer medication to 8 residents, for example at 7 am, where you need to prepare and administer all tablets or medications separately. We also have children that need 10 or 12, sometimes there are also capsules and also syrups and

P7: And drops.

Knowledge of guidelines & clear administration instructions

In all focus group interviews, participants indicated that their medication-related knowledge of guidelines is low. Participants also indicated that guidelines they are aware of, are often not adhered to because they do not see the point. Nonetheless, they also stated that they would follow guidelines if they knew why these guidelines are important or when being obliged to.

P6: When they say 'you need to do that this way', who are we to say we won't do that? After all, we do not have enough knowledge about medication.

P1: Well, if we have to, we will need to... If we know why...

This was particularly mentioned when discussing the guideline recommendations not to mix medications, to dilute liquid medication, to use protective equipment, to stop enteral feeding during medication administration, and to flush the EFT. Participants also expressed their need for clear instructions and documentation on medication administration via EFT, since current instructions in the participating RCFs are often unclear or missing, and hence different working methods are followed by different staff members.

M: And would you like to have more information? I've heard "we don't know enough about this". What is it that you would like to know on this topic?

(Silence)

P1: What's the right... How you need to do this the right way.

P6: Yes.

P1: Yes, since we all work differently...

Habits

It was mentioned in relation to almost all guidelines that current working procedures are often a simple case of habit and routine. According to the participants, this is a barrier as well as a facilitator. Habits may be difficult to change, but once guideline implementation is achieved, it may become the new habit to adhere to the guideline.

P21: I think that medication administration actually is heavily underestimated. We do so many things out of habit.

M: Are there other reasons?

(Silence)

P23: I also think habit, I think... that we have learned it that way...

P22 & M: Yes

P23: ... And that we keep working like this.

P24: Yes, indeed. It would be an adjustment.

P1: Actually, it's a routine you need to get into.

P(multiple participants): "Yes." and "That's right."

P1: It's a routine. Once you are used to it, you're on a roll.

Lack of necessary material & practical issues

Having insufficient or no proper material (e.g. crushing device, syringes, gloves and masks as protective equipment) and the costs for the needed material, were perceived as barriers for following guideline recommendations. Some also mentioned that working according to guidelines would make manipulation of medication more difficult, for example when having to open capsules or having to work with protective gloves during medication preparation.

P9: But I think gloves to prepare medication... I don't know if that's handy to open something.

P8: That's not easy.

P(multiple participants): Yes

Limited gastric fluid tolerance of some residents

The limited gastric fluid tolerance of some EFT residents was perceived as a factor that makes it impossible to follow guideline recommendations such as 'dilute liquid medication with at least an equal amount of water', 'flush the EFT between drugs' and 'avoid mixing together medications', especially when multiple medications need to be administered. The respondents thought that the total amount of fluid intake when working according to all these guideline recommendations, might be too high for certain residents. According to some participants, discussing the resident's (individual) fluid intake with the staff members of the medical office and other stakeholders would facilitate adherence to these guidelines.

M: And would it be manageable to flush between drugs? (...)

P21: Then we have the problem again of

P23: Problem of amounts.

P21: Far too much that's injected.

M: You can solve this by administering less fluid afterwards.

P17: Yes, we need to review all this one time. (...) Or the dietician too. Ask the medical office and the dietician.

P15: Yes.

Comfort & safety of the resident

Some participants were inclined not to follow certain guideline recommendations because they could cause discomfort for the resident. For example, the extra time needed for medication administration when administering drugs separately, would leave the resident uncovered too long during night shifts, or the larger amounts of fluid could make the resident vomit. On the other hand, the improved

resident's well-being resulting from following guidelines (because of the increased effect of medication), was mentioned as a potential motivator for guideline adherence. In two of the focus groups, participants also mentioned that not mixing together medications makes it easier to control what drug is administered. Hence, following this guideline recommendation would promote safe medication handling.

Noteworthy in the context of the resident's safety is that some participants reported that treating physicians did not always consider that a prescribed drug needs to be administered through the EFT. It is reported that the participants are often the ones pointing this out to the prescriber.

DISCUSSION

In this study, staff members of RCFs for people with an intellectual disability identified barriers and facilitators to following guideline recommendations for drug administration through EFT.

We found that *time constraints* were prominent. This is in line with previous studies in different areas of health care identifying lack of time and workload as factors hindering guideline adherence and contributing to the occurrence of medication errors ^{5;8-12}. Focus group participants argued that some guideline recommendations (e.g. 'avoid mixing together medications') are too time consuming to implement, especially when only one staff member is on duty. They suggested that assigning responsibility for medication preparation and administration to an extra staff member, would facilitate guideline adherence. In the hospital setting, increased staffing levels have been shown to be associated with less adverse patient outcomes ^{10;13;14}. However, in our setting, an extra staff member may be unrealistic due to budgetary constraints. A more realistic approach to meet this barrier may be to more efficiently organize the staff members' different tasks, including medication preparation and administration.

Participants also indicated that their *knowledge* about medication administration via EFT is insufficient, and that this prevents them from following guidelines. This is consistent with previous research mentioning lack of knowledge as a barrier for guideline adherence ⁸ and as a factor contributing to medication administration errors ¹⁰. Hanssens et al. ¹⁵ and Dashti-Khavidaki et al. ¹⁶ demonstrated that an educational program significantly improved nurses' knowledge on drug administration via EFT. These educational programs consisted of training sessions ^{15;16}, and the provision of proper materials and detailed working instructions on medication preparation and administration via EFT ¹⁶.

In our study, a *lack of clear instructions* for medication preparation and administration was mentioned. This supports the finding of our previous study that RCFs often do not have standard operating procedures for medication management or do not use the available procedures ²⁴. Yet, it has been

found that simplification and standardization are effective as a forcing means by decreasing reliance on individualized decision-making. Several initiatives that standardized medication ordering and administration protocols, resulted in improvements in patient outcomes and nurse efficiency ²⁵. Noteworthy in this context is that our study participants mentioned that they learned from each other how to administer medication through EFT. However, most of the participants were educators without medical training. A recent systematic review reported that even nurses passed on bad practices leading to medication errors in hospitals ¹⁹. This points out the high risk of copying “bad practice” from colleagues within the setting of RCFs for individuals with an intellectual disability. Since it has been demonstrated that not following procedures may contribute to medication administration errors ^{8;26}, it seems evident that a lack of clear instructions on a complex matter such as medication administration via EFT in combination with a lack of knowledge, can lead to a routine of medication errors and suboptimal patient outcomes.

Habits were reported as both barrier and facilitator. The difficulty of changing habits has already been mentioned in previously published reviews stating that change was hindered by daily routine taking over ⁶ and by anxiety about changing practice ¹⁷. Deep-seated routines are often difficult to change despite awareness and familiarity with the guideline, hence hindering the development of new routines ¹⁶. Nonetheless, our study participants also showed willingness to change and considered working according to guidelines as a simple case of habit and routine. Yet, it is very tempting to fall back in old habits after a while ²⁷. Therefore, it is important to repeat educational sessions on a regular basis (e.g. every year), and to evaluate systematically drug administration practices through EFT and staff’s knowledge on this topic.

Lack of necessary materials was reported as an obstacle for following guidelines. In a Cochrane review ¹⁷, the lack of facilities was also identified as a barrier to change. It is therefore vital for RCFs to provide sufficient and adequate materials (e.g. gloves) to their staff members.

Another reported barrier was the *limited gastric fluid tolerance* in certain residents, often children. The A.S.P.E.N. guidelines recommend for pediatric doses to use less fluid for dilution and flushing (with a minimum volume ratio of 50/50 water/drug), and at least 5mL when fluid is not restricted ². A balance must be found between the maximum fluid intake of fluid-restricted patients and the minimal volume required to dilute medications or to flush the EFT. Therefore, fluid intake should be discussed with the RCF’s medical staff and other relevant stakeholders (e.g. dietician), and fixed volumes should be established for each individual of this special subpopulation. However, this does not seem to affect the overall applicability of the guideline recommendations regarding dilution and EFT flushing, since in our previous observational study only one resident out of 48 needed to follow a fluid-restriction regimen ⁵.

Participants also described the potential of improving the resident's *well-being* as facilitator, as well as being in *control* of medication administration when following guidelines. These facilitators can be used as motivators for guideline adherence during implementation and follow-up.

This study had some limitations. First, generalizability to other countries may be limited because of differences in the health care system or the characteristics of the RCFs. Yet, our findings may contribute to the further exploration of this topic in other settings. Second, although saturation of data was reached, only barriers and facilitators perceived by the participants are reported in our study. We can therefore not exclude the existence of additional barriers and/or facilitators in daily practice. Third, this study was limited by its purposeful sample of staff members willing to discuss their views on guideline adherence concerning medication administration through EFT.

Based on our findings, an intervention tailored to the needs of this setting can be set up and evaluated. To ensure the safe handling of medicines, we recommend to develop comprehensive policies and procedures. A description of the complete medication management process should be included in the quality handbook of the RCF, including procedures concerning medication administration through EFT. This approach may stimulate compliance with current recommendations and improve medication administration practices. Organizations also need to ensure that medication-related policies are practical and up-to-date, and that there are systems in place to ensure that (enteral) medication administration is conducted safely. Furthermore, medication administration practices should be evaluated on an ongoing basis for risk points and possible improvements. Medical office staff members for example, can observe regularly how medication is prepared and administered to the residents in order to verify whether protocols are followed and whether problems arise in practice.

Attention for the education of RCF staff members is another important aspect. However, first, further research is needed into the actual knowledge level of RCF-staff members in order to be able to develop an education intervention based on the current guidelines on medication administration through EFT, which focusses on staff's knowledge gaps and takes into account staff's mainly non-medical background.

CONCLUSION

Our study identified a number of perceived barriers and facilitators to following guidelines for medication administration via EFT. Based on these findings, an intervention can be set up to promote guideline adherence. Priority should be given to the provision of necessary materials, enhancement of knowledge, and providing clear administration instructions.

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Chapter 6: KNOWLEDGE OF STAFF MEMBERS OF RESIDENTIAL CARE FACILITIES FOR INDIVIDUALS WITH INTELLECTUAL DISABILITY ON MEDICATION ADMINISTRATION VIA ENTERAL FEEDING TUBE

This chapter is submitted as:

Joos E, Mehuys E, Van Bocxlaer J, Remon JP, Van Winckel M, Boussery K. Knowledge of staff members of residential care facilities for individuals with intellectual disability on medication administration via enteral feeding tube. Submitted to *Journal of Intellectual Disability Research*, under review (May 2015)

ABSTRACT

Background: Guideline recommendations for the safe administration of drugs through enteral feeding tube (EFT) are an important tool to minimize the risk of errors. This study aimed to investigate knowledge of these recommendations among staff of RCFs for people with intellectual disability (ID).

Method: Knowledge of guideline recommendations was assessed using a 13-item self-administered questionnaire. Questions reflected key aspects of guideline recommendations on medication administration via EFT. All staff members that administer medication through EFT in Belgian RCFs were invited to participate (n=553).

Results: Nine out of ten RCFs participated, and 356 questionnaires were collected. Almost all participants were female (96%), and most (82%) had a non-nursing educational background. Mean self-perceived knowledge of medication administration via EFT was 6.7 (on a 0-10 scale). On average 5.7 (SD 1.9) out of 13 questions were answered correctly. A nursing degree and previous education on medication administration via EFT were associated with significant higher scores. Guideline recommendations regarding rinsing of the used medicine cup (90% correct answers) and preparation of hard gelatin capsules (89%) were known best. Those regarding the use of protective equipment when crushing toxic substances (4% correct answers), crushing of sustained release and enteric coated dosage forms (6%), elevation of the patient's backrest (14%), and flushing of the EFT (15%) were known the least.

Conclusion: This study identified a substantial lack of knowledge of guidelines for drug administration through EFT among staff of RCFs for people with ID. Our findings call for tailored educational programs in order to increase knowledge.

Keywords: knowledge, medication administration, enteral feeding tube, guideline, residential care facility, intellectual disability

INTRODUCTION

Since many individuals with intellectual disability (ID) experience feeding problems, especially those with severe or profound ID¹, enteral feeding tubes (EFT) are often used for medication administration in this population². However, due to the complexity of medication administration through EFT, this route is prone to errors, such as the administration of drugs that are not compatible with EFT, an incorrect preparation of the administered drug, and/or improper administration techniques³⁻⁵. These errors can cause tube obstruction, reduced drug efficacy, or increased adverse effects⁶, and thereby lead to patient harm or even death⁷. Guideline recommendations for the safe administration of drugs through EFT are available^{2;6}, but in a previous publication⁴ we described that staff members of residential care facilities (RCFs) for people with ID do often not adhere to them. Main deviations from guideline recommendations observed in RCFs were mixing together multiple drugs, not shaking suspensions/emulsions before use, not selecting the most appropriate dosage form, and not flushing the EFT before and between medication administrations. In a study exploring barriers and facilitators for following guidelines, staff's lack of knowledge of guidelines emerged as an important perceived barrier⁸. Previous research on knowledge of guidelines for drug administration through EFT already demonstrated that nurses working in the hospital setting had insufficient knowledge on this topic^{9;10}. But, to the best of our knowledge, no study has ever evaluated the knowledge on medication administration through EFT in a care setting for people with ID. However, such data may be highly valuable for the development of tools and interventions aimed at improving guideline implementation, and, consequently, care for this specific patient population. Therefore, the aim of this study was to examine knowledge of staff members of RCFs for people with ID on current guidelines for drug administration through EFT.

METHODS

Study design & participants

This questionnaire study was conducted from February until May 2014 in Belgian RCFs providing residential care for children and adults with an ID. We approached all RCFs in Flanders (the Dutch speaking part of Belgium) with at least 10 residents with EFT. In each of the participating RCFs, all staff members that administer medication through EFT were invited to participate in the study. Staff members' consent to participate was indicated by the completion and return of the questionnaire.

Questionnaire

A 13-item self-administered questionnaire was developed by three pharmacists (EJ, EM and KB). Each question reflected a key point from the guideline recommendations on medication preparation and administration via EFT ² (Table 1).

Drugs mentioned in the questions were chosen based on data of our previous observational study ⁴, so that only drugs commonly used in this setting were included. The questionnaire was pilot tested with two RCF staff members, who provided us with written feedback on question relevance, wording and sequence, overall questionnaire layout and instructions. In addition to the 13-item questionnaire, participant characteristics (age, gender, work experience, educational level, and education received concerning medication administration via EFT) were collected, and participants were asked to rate their self-perceived level of knowledge on medication administration via EFT on a scale of 0 (= no knowledge) to 10 (= excellent knowledge).

Data collection

Eligible staff members received an envelope containing the questionnaire and a cover letter. The cover letter outlined the purpose of the project and participation requirements, requested participation through completion and return of the accompanying questionnaire, and assured respondents of confidentiality and anonymity. Furthermore, during distribution of the questionnaires, the investigator pharmacist held brief information sessions on each unit for the staff members present, informing them on the study objectives and participation requirements mentioned in the cover letter, and they were given the opportunity to ask questions. The staff members were also instructed to answer the questionnaire according to their ready knowledge. Completed questionnaires were posted in a box specifically provided in each participating RCF, and collected by the researchers after two weeks.

Data analysis

For each item of the questionnaire, we determined the number of participants answering correctly. We also calculated a total score for each participant by giving one point to each correct response, resulting in a total score ranging from 0 to 13. For questions with more than one correct answer (Q3, Q4, Q5, Q7, Q9), participants had to find all the correct answers to get the question right. The effect of participant characteristics on the total score was evaluated using scatter plots for continuous variables (age, work experience, and self-perceived knowledge) and independent sample t-tests and one-way ANOVA tests for categorical variables (educational qualifications, and education during studies and/or career). All statistical analyses were performed using SPSS 21.0 for Windows (SPSS Inc., Chicago, IL, USA). A *P* value <0.05 was considered statistically significant. A feedback report with the results was sent to all participating RCFs.

Table 1 Proportion of staff members (n=356) answering correctly to each question. For questions with multiple correct answers (Q3, Q4, Q5, Q7, Q9), participants had to find all the correct answers to get the question right; the numbers in italic indicate the percentage of participants that ticked the corresponding correct answer option.

| Question | n | (%) |
|--|-----|-------|
| <i>MEDICATION PREPARATION</i> | | |
| 1. <i>If a resident needs to receive multiple drugs at one administration moment, they can simply be prepared and administered together.</i> | 140 | (39%) |
| a. Correct | | |
| b. Incorrect, the drugs need to be prepared separately; however, they can be mixed just before administration | | |
| c. Incorrect, the drugs need to be prepared and administered separately | | |
| d. I do not know | | |
| 2. <i>Hard gelatin capsules are preferably (complete) before administering through enteral feeding tube</i> | 316 | (89%) |
| a. dissolved in water | | |
| b. opened, and the content mixed with water | | |
| c. I do not know | | |
| 3. <i>Which of the following liquid dosage forms should be shaken before use? (multiple answers possible)</i> | 127 | (36%) |
| a. Motilium® (domperidone) | 232 | (65%) |
| b. Depakine® (valproic acid) | | |
| c. Keppra® (levetiracetam) | | |
| d. Tegretol® (carbamazepine) | 143 | (40%) |
| e. I do not know | | |
| 4. <i>Which of the following tablets should NOT be crushed for administration through gastric feeding tube (multiple answers possible)</i> | 21 | (6%) |
| a. Depakine Chrono® (valproic acid) | 114 | (32%) |
| b. Topamax® (topiramate) | | |
| c. Losec Mups® (omeprazole) | 74 | (21%) |
| d. Lioresal® (baclofen) | | |
| e. Carbamazepine CR® | 32 | (9%) |
| f. I do not know | | |
| 5. <i>Which of the following solid dosage forms require the use of protective equipment (i.e. mask and gloves) during crushing? (multiple answers possible)</i> | 13 | (4%) |
| a. Amoxicilline® | 36 | (10%) |
| b. Frisium® (clobazam) | | |
| c. Euthyrox® (levothyroxine) | 17 | (5%) |
| d. Risperdal® (risperidone) | | |
| e. I do not know | | |
| 6. <i>Liquid dosage forms as well as solid dosage forms should be diluted before administration via enteral feeding tube.</i> | 106 | (30%) |
| a. Correct | | |
| b. Incorrect, only solid dosage forms should be diluted | | |
| c. I do not know | | |
| 7. <i>Which of the following Depakine® (valproic acid) dosage forms is/are preferably used for administration through gastric feeding tube? (multiple answers possible)</i> | 122 | (34%) |
| a. Depakine Chrono® tablets | | |
| b. Depakine® syrup | 228 | (64%) |
| c. Depakine® drops | 191 | (54%) |
| d. Depakine Enteric® tablets | | |
| e. I do not know | | |

MEDICATION ADMINISTRATION

| | |
|--|------------------------------|
| 8. What is the standard procedure regarding enteral feeding when medication needs to be administered? | 222 (62%) |
| a. The enteral feeding does not need to be stopped | |
| b. The enteral feeding needs to be stopped | |
| c. The enteral feeding needs to be stopped, and the feeding tube needs to be flushed with water | |
| d. The enteral feeding only needs to be stopped when administering certain drugs | |
| e. The enteral feeding only needs to be stopped when administering certain drugs, and the feeding tube needs to be flushed with water | |
| f. I do not know | |
| 9. When administering medication through an enteral feeding tube, the enteral feeding tube needs to be flushed (complete) (multiple answers possible) | 52 (15%)^x |
| a. before medication administration | 166 (47%) |
| b. between every medication administration (if multiple drugs are administered) | 84 (24%) |
| c. after medication administration | 332 (93%) |
| 10. The preferred flush solution for an enteral feeding tube is | 263 (74%)¹ |
| a. Cola | |
| b. Water | |
| c. Orange juice | |
| d. Enteral feeding | |
| e. I do not know | |
| 11. What is the minimum volume of flush solution needed to flush the enteral feeding tube? | 268 (75%) |
| a. 5 mL | |
| b. 15 mL | |
| c. The quantity does not matter | |
| d. I do not know | |
| 12. When medication is prepared in a medicine cup (e.g. dissolved), the medicine cup needs to be rinsed with water. | 320 (90%) |
| a. Correct | |
| b. Incorrect | |
| c. I do not know | |
| 13. When administering medication through an enteral feeding tube, should the patient's backrest be elevated? | 49 (14%)² |
| a. No, that is not necessary | |
| b. Yes, the backrest should be elevated to an angle of at least 10° | |
| c. Yes, the backrest should be elevated to an angle of at least 30° | |
| d. Yes, the backrest should be elevated to an angle of 90° | |
| e. Yes, the backrest should be elevated, but I do not know to which angle | |
| f. I do not know | |

^xOne participant did not answer this question¹ 25% ticked cola as the preferred flush solution² An additional 17% ticked option b, c or d

RESULTS

Participants

Nine out of ten contacted RCFs agreed to participate. In these nine RCFs, a total of 553 questionnaires were distributed, of which 356 (64%) were returned. Characteristics of the participating staff members are displayed in Table 2. Almost all participants were female (96%), and most (82%) had a non-nursing educational background. Mean self-perceived knowledge of medication administration via EFT was 6.7 (SD 1.7) (on a 0-10 scale).

Table 2 Characteristics of the participating staff members (n=356)

| <i>Participant characteristics</i> | |
|--|-------------|
| Age (years), mean (SD) | 38.8 (11.2) |
| Female | 341 (96%) |
| Completed educational qualifications * | |
| Nursing | 65 (18%) |
| <i>Secondary education</i> | 27 (8%) |
| <i>Bachelor</i> | 38 (11%) |
| <i>Master</i> | 0 (0%) |
| Non-medical education | 287 (82%) |
| <i>Secondary education</i> | 164 (47%) |
| <i>Bachelor</i> | 113 (32%) |
| <i>Master</i> | 10 (3%) |
| Previous education on medication administration via EFT * | |
| Only during studies | 16 (5%) |
| Only during career | 172 (49%) |
| During studies & career | 39 (11%) |
| Work experience in the sector of ID (years), median (range) * | 15 (<1-39) |
| Work experience with medication administration via EFT (years), median (range) * | 8 (<1-39) |
| Self-perceived knowledge of medication administration via EFT on a 0-10 scale, mean (SD) * | 6.7 (1.7) |

Data are presented as n, unless indicated otherwise.

** Not all participants answered each question*

EFT, enteral feeding tube

ID, intellectual disability

Total questionnaire score

From a maximum score of 13, the participating staff members obtained on average 5.7 (SD 1.9, range 0.0-11.0) or 44% (SD 14%, range 0%-85%). Score frequencies are presented in Figure 1. Participants with a nursing degree scored significantly better (mean score of 7.0±1.7) than those without a nursing

degree (mean score of 5.4 ± 1.7) (mean difference 1.6 (95% CI 1.2 to 2.1), $p=0.000$). Of those reporting to have received education on medication administration via EFT during studies and/or career, total scores were significantly higher (5.9 ± 1.9 vs 5.3 ± 1.8 ; mean difference 0.6 (95% CI 0.23 to 1.0), $p=0.002$). Scatter plots showed no correlation between the other investigated participant characteristics (age, work experience, self-perceived knowledge) and the total score.

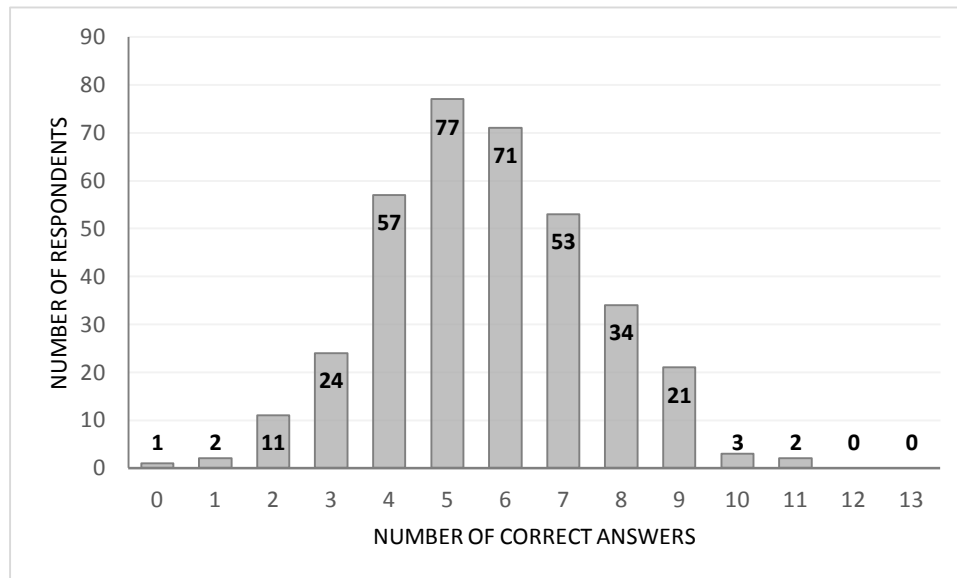


Figure 1 Distribution of scores ($n_{\text{all respondents}}=356$)

Individual questions

The proportion of staff members answering correctly to the individual questions is shown in Table 1. The guideline recommendations concerning the preparation of hard gelatin capsules (Q2) and the rinsing of the used medicine cup (Q12) were known best. The guideline recommendations regarding the crushing of sustained release and enteric coated dosage forms (Q4), the use of protective equipment when crushing toxic substances (i.e. antibiotics and hormones in Q5), the flushing of the EFT (Q9), and the elevation of the backrest (Q13) were known the least.

DISCUSSION

This study identified a substantial lack of knowledge of guideline recommendations for drug administration through EFT among staff of RCFs for people with ID. This knowledge gap may, at least in part, explain the high rates of guideline nonadherence observed in our previous study ⁴. Yet, implementing guideline recommendations for the safe administration of drugs through EFT is an

essential element in preventing medication errors ^{11;12}. This is particularly relevant when caring for individuals with ID as they may be at increased risk of errors due to their high medication use ¹³ and the fact that they may not be aware of errors because of their cognitive impairment ¹⁴.

The present study is the first providing data on knowledge of guidelines for drug administration through EFT in the setting of RCFs for people with ID. Previous studies on this topic evaluated knowledge of nurses working in hospitals ^{9;10}. *Dashti-Khavidaki et al.* (2012) conducted a pre-post study to evaluate effectiveness of a clinical pharmacist-led educational program in improving ICU nurses' knowledge and practice regarding medication administration via EFT ¹⁰. They found that nurses' baseline knowledge was not sufficient. However, the educational program significantly improved knowledge as well as practice. *Hanssens et al.* (2006) evaluated ICU nurses' knowledge needed for the correct administration of oral medicines in patients with swallowing problems and feeding tubes ⁹. While most nurses were aware of the purpose of controlled release formulations, knowledge on the controlled release codes used by companies and the consequences of crushing those preparations was low. A 2-day training course greatly improved knowledge.

The present study demonstrated that some aspects of the guideline recommendations are well-known by RCF staff members, i.e. that hard gelatin capsules should be opened, that medicine cups should be rinsed, that water is the preferred flush solution, and that after medication administration the EFT should be flushed with at least 15 ml water. Except for rinsing the medicine cup, we actually found high adherence ($\geq 2/3$ of observations) to these items in our previous direct observation study. This suggests that staff members are generally willing to apply the guidelines they know. All other aspects of guideline recommendations were poorly known by our study population. Least known items included: identifying tablets that should not be crushed from a list of commonly used medications in the RCF setting, when to wear protective equipment (mask and gloves), flushing the EFT between every medication administration, and elevating the patient's backrest. Not surprisingly, adherence to these items showed to be poor in our previous observational study ⁴. The fact that, in RCFs, medication is mainly administered by non-medically trained staff (e.g. educators) ¹⁵ could be a possible explanation for the inadequate guideline knowledge observed in this study. This suggestion is supported by the significantly higher total scores obtained by staff with a nursing degree compared to those without. Although it should be noted that even for participants with a nursing degree total knowledge scores were quite low (mean score of 7 out of 13). Having received education on medication administration via EFT (of which the content was not known) showed to have a significant but rather small positive effect on questionnaire scores.

This study provides a strong incentive for the development of tailored educational programs in order to increase knowledge of current guidelines among staff of RCFs for people with ID. As RCFs for people with ID purchase their medication from community pharmacies ¹⁵, community pharmacists are ideally

placed to provide training and advice on medication administration via EFT. Intervention programs involving a pharmacist, such as training sessions led by a pharmacist, have shown to reduce medication errors and/or improve staff's knowledge on medication administration via EFT in RCFs for people with ID ⁵, as well as in the hospital ^{3;9;10;16} and nursing home sector ¹⁷. To improve guideline knowledge in RCFs for people with ID, an ongoing educational program on drug administration via EFT should be organized and this should be considered as a mandatory refresher program for all staff members involved in drug administration to patients with EFT. However, knowing the guidelines is insufficient to achieve successful implementation ^{18;19}. Also other factors, such as staff members' attitudes and organizational barriers, need to be mapped and tackled. The present survey was part of a larger research project aimed at seeking potential explanations for the poor compliance to guidelines for drug administration via EFT in RCFs for people with ID. This project also included a focus group study with staff members of RCFs on barriers for guideline implementation ⁸. This study showed that aside from lack of knowledge, organizational aspects such as time constraints and lack of adequate materials (e.g. crushing devices, masks, gloves) keep RCF staff members from following recommendations. Also the inertia of current practice, not seeing the point of guidelines and concerns about the patient's comfort (e.g. longer duration of drug administration when having to administer all drug separately) were reported as barriers. However, focus group participants were generally very receptive to the idea of implementing the guidelines in their daily practice.

Our study had some limitations. The self-selection of respondents holds the risk of selection bias as staff with higher interest in the topic may be more likely to participate. However, if this were the case in this study, it would only have led to a conservative estimate of the knowledge gap. Our results may also overestimate staff members' knowledge because of guessing during questionnaire completion. However, the eligible participants were informed about the confidential and anonymized processing of data, and about the academic and non-punitive nature of the study. Another possible limitation is that the questionnaire we used was not formally validated, but all questions were based on widely accepted guideline recommendations (face validity).

CONCLUSION

Our questionnaire study demonstrated that staff members of RCFs for individuals with ID have a lack of knowledge on the current guideline recommendations for medication administration through EFT. In order to optimize care for this specific population, improving staff members' knowledge is an important prerequisite. The findings of this study can aid in the development of an educational intervention adapted to the needs of this practice setting.

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Chapter 7: MEDICATION ADMINISTRATION VIA ENTERAL FEEDING TUBE: A SURVEY OF PHARMACISTS' KNOWLEDGE

This chapter is accepted for publication as:

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ABSTRACT

Background: Medication administration to patients with an enteral feeding tube (EFT) is complex and prone to errors. Community pharmacists may be ideally placed to provide training and advice on this topic in individual patients as well as in institutions supplied by the pharmacy.

Objective: To assess community pharmacists' knowledge on guideline recommendations regarding medication preparation and administration through EFT.

Method: Knowledge of guideline recommendations was assessed using a 15-item self-administered online questionnaire (April – June 2014). Questions reflected key aspects of guideline recommendations on medication administration via EFT. All graduated community pharmacists from the Dutch-speaking part of Belgium were eligible for participation.

Results: A total of 105 community pharmacists completed the questionnaire. Median self-perceived knowledge of medication administration via EFT was 2 (on a 0-10 scale). On average 5.2 (SD 2.6) out of the 15 questions were answered correctly. Strikingly, the ability to select suspensions in a list of liquid medications and knowledge on crushability of solid dosage forms were low.

Conclusion: Our findings demonstrate that pharmacists' knowledge on correct medication administration via EFT is too limited to be able to provide good advice to EFT patients or their caregivers. Tailored training on this topic is needed.

Keywords: pharmacist, knowledge, medication administration, enteral feeding tube, guideline

INTRODUCTION

Medication administration through an enteral feeding tube (EFT) is at risk of errors such as inappropriate dosage form selection, crushing non-crushable drugs, and wrong administration techniques. These errors can lead to reduced drug efficacy, increased adverse effects, and tube obstruction ¹. To reduce these risks, guidelines for the safe administration of drugs via EFT have been available for many years ^{1,2}. Community pharmacists may be ideally placed to provide training and advice in the application of these guidelines in individual patients as well as in institutions supplied by the community pharmacy. However, there are currently no data available on the actual level of knowledge about drug administration through EFT among community pharmacists. This is important as this determines the quality of their advice. Therefore, the present study aims to investigate community pharmacists' knowledge on current guidelines for medication administration via EFT.

METHODS

Study design and participants

This questionnaire study was carried out from April to June 2014 in Belgium. All graduated community pharmacists from the Dutch-speaking part of Belgium were eligible for participation. Consent to participate was indicated by completion of the questionnaire.

Data collection

A 15-item self-administered questionnaire was developed by two pharmacists (EJ and KB) and a fourth-year pharmacy student (SV). Each question reflected a key point from the guideline recommendations on medication administration via EFT ^{1,2} (Table 1).

Table 1 Proportion of pharmacists (n=105) answering correctly to each question. For questions with multiple correct answers (Q3, Q4, Q5, Q7, Q10, Q14), participants had to find all the correct answers to get the question right; the numbers in italic indicate the percentage of participants that ticked the corresponding correct answer option.

| Question | n (%) |
|--|----------|
| <i>MEDICATION PREPARATION</i> | |
| 1. <i>If a patient needs to receive multiple drugs at one administration moment, what is the correct procedure?</i> | 51 (49%) |
| a. Prepare the drugs together (e.g. crushing or dissolving together), and administer together | |
| b. Prepare the drugs separately; however, they can be mixed just before administration and they can be drawn together into the syringe | |
| c. Prepare and administer the drugs separately | |
| d. I do not know | |

| | |
|--|-----------------|
| 2. Hard gelatin capsules that are not enteric coated, are preferably (complete) before administering through enteral feeding tube | 82 (78%) |
| a. dissolved in water | |
| b. opened, and the content mixed with water | |
| c. I do not know | |
| 3. Which of the following liquid dosage forms should be shaken before use? (multiple answers possible) | 13 (12%) |
| a. Motilium® (domperidone) | 43 (41%) |
| b. Depakine® (valproic acid) | |
| c. Keppra® (levetiracetam) | |
| d. Tegretol® (carbamazepine) | 26 (25%) |
| e. I do not know | |
| 4. Which of the following tablets should NOT be crushed when administered by gastric feeding tube (multiple answers possible) | 63 (60%) |
| a. Depakine Chrono® (valproic acid) | 81 (77%) |
| b. Topamax® (topiramate) | |
| c. Losec Mups® (omeprazole) | 70 (67%) |
| d. Lioresal® (baclofen) | |
| e. Carbamazepine CR® | 83 (79%) |
| f. I do not know | |
| 5. Which of the following tablets require the use of protective equipment (i.e. mask and gloves) during crushing? (N.B.: All tablets in this question can be crushed) (multiple answers possible) | 15 (14%) |
| a. Amoxicilline® | 24 (23%) |
| b. Frisium® (clobazam) | |
| c. Euthyrox® (levothyroxine) | 37 (35%) |
| d. Risperdal® (risperidone) | |
| e. I do not know | |
| 6. Liquid dosage forms should be diluted before administering via enteral feeding tube. | 20 (19%) |
| a. Correct | |
| b. Incorrect | |
| c. I do not know | |
| 7. Which of the following Depakine® (valproic acid) dosage forms is/are preferably used for administration through gastric feeding tube? (multiple answers possible) | 65 (62%) |
| a. Depakine Chrono® tablets | |
| b. Depakine® syrup | 72 (69%) |
| c. Depakine® drops | 78 (74%) |
| d. Depakine Enteric® tablets | |
| e. I do not know | |

MEDICATION ADMINISTRATION

| | |
|--|-----------------|
| 8. Can medication be added directly to an enteral feeding formula? | 30 (29%) |
| a. Yes, all medications can be added directly to an enteral feeding formula | |
| b. Yes; however, not all medications can be added directly to an enteral feeding formula | |
| c. No, medication should not be added directly to an enteral feeding formula | |
| d. I do not know | |

| | |
|--|-----------------|
| 9. What is the recommended procedure regarding enteral feeding when medication needs to be administered? | 33 (31%) |
| a. Administration of the enteral feeding can be continued during medication administration | |
| b. The enteral feeding only needs to be stopped before medication administration | |
| c. The enteral feeding needs to be stopped, and the feeding tube needs to be flushed before medication is administered | |
| f. I do not know | |
| 10. When administering medication through an enteral feeding tube, the enteral feeding tube needs to be flushed (complete) (multiple answers possible) | 10 (10%) |
| a. before medication administration | 26 (25%) |
| b. between every medication administration (in case of multiple drugs administered at the same moment) | 32 (30%) |
| c. after medication administration | 45 (43%) |
| d. I do not know | |
| 11. The preferred flush solution for an enteral feeding tube is | 83 (79%) |
| a. Cola | |
| b. Water | |
| c. Orange juice | |
| d. Enteral feeding | |
| e. I do not know | |
| 12. What is the minimum volume of flush solution needed to flush the enteral feeding tube? | 31 (30%) |
| a. 5 mL | |
| b. 15 mL | |
| c. The quantity does not matter | |
| d. I do not know | |
| 13. When administering medication through an enteral feeding tube, should the patient's backrest be elevated? | 11 (10%) |
| a. No, that is not necessary | |
| b. Yes, the backrest should be elevated to an angle of at least 10° | |
| c. Yes, the backrest should be elevated to an angle of at least 30° | |
| d. Yes, the backrest should be elevated to an angle of 90° | |
| e. Yes, the backrest should be elevated, but I do not know to which angle | |
| f. I do not know | |
| 14. Which of the following drugs can have a decreased bioavailability when administered through a jejunostomy tube? (multiple answers possible) | 1 (1%) |
| a. Ketoconazol | 15 (14%) |
| b. Depakine® (valproic acid) | |
| c. Cefalexine (Keforal®) | 4 (4%) |
| d. Iron | 24 (23%) |
| e. I do not know | |
| 15. What would you recommend when a patient asks you how to unclog an enteral feeding tube that is clogged after medication was administered? (open-ended question) | |
| Flush tube with water | 36 (34%) |
| Flush tube with other fluids than water | 5 (5%) |
| Replace tube | 4 (4%) |
| Consult other professionals for advice | 23 (22%) |
| I do not know | 37 (35%) |

All questions but one (i.e. open question on tube obstruction (Q15)) were multiple choice questions. The questionnaire was pilot tested with three community pharmacists who provided feedback on question relevance, wording and sequence, overall questionnaire layout and instructions. In addition to the guideline-related items, background information on the participating pharmacists was collected (gender, age, work experience, whether they are consulted by patients with EFT, whether they deliver medication to residential care facilities for individuals with intellectual disability who also have EFT, and whether they received postgraduate training concerning medication administration via EFT). Participants were also asked to rate their self-perceived level of knowledge on medication administration via EFT on a scale of 0 (= no knowledge) to 10 (= excellent knowledge). At the end of the questionnaire each participant had to indicate whether he had used information sources during completion. The questionnaire was made electronically accessible using Qualtrics software (Qualtrics Inc., Provo, UT). All five local pharmacists' professional organisations were asked to forward an e-mail to their members describing the purpose of the study and including a web link to the questionnaire (a total of approximately 4470 pharmacists).

Data analysis

For each item of the questionnaire, the number of participants answering correctly was determined. For questions with more than one correct answer (Q3, Q4, Q5, Q7, Q10, Q14), participants had to find all the correct answers to get the question right. Answers to the open-ended question were categorized. We also calculated a total score per participant by giving one point to each correct response, resulting in a total score ranging from 0 to 15. The effect of participant characteristics on the total score was evaluated using scatter plots for continuous variables (age, work experience, and self-perceived knowledge) and independent sample t-tests for categorical variables (being consulted by EFT patients, postgraduate training received concerning medication administration via EFT, and use of information sources during questionnaire completion). All statistical analyses were performed using SPSS 21.0 for Windows (SPSS Inc., Chicago, IL, USA). A *P* value <0.05 was considered statistically significant.

RESULTS

In total, 105 pharmacists completed the questionnaire (estimated response rate 2%). Participants' background characteristics are detailed in Table 2. Thirty-one percent (33/105) of the pharmacists had EFT patients among their patients, and five of these (5/33) also delivered medication to residential

care facilities (RCFs) for people with intellectual disabilities (ID). Median self-perceived knowledge of medication administration via EFT was 2 (on a scale of 0-10 scale).

Table 2 Participant background characteristics

| Background characteristics | |
|--|----------|
| Female | 74 (70%) |
| Age (years) | |
| 21-30 | 41 (39%) |
| 31-40 | 26 (25%) |
| 41-50 | 21 (20%) |
| > 50 | 17 (16%) |
| Work experience in community pharmacy (years) | |
| 0-10 | 55 (52%) |
| 11-20 | 22 (21%) |
| 21-30 | 18 (17%) |
| > 30 | 10 (10%) |
| ≥ 1 patient with EFT in the pharmacy | 33 (31%) |
| Delivers medication to ≥ 1 residential care facility for individuals with intellectual disability who also have EFT | 5 (5%) |
| Postgraduate training on medication administration via EFT | |
| Completed | 2 (2%) |
| Perceives need for training | 74 (70%) |
| Is willing to give training in residential care facilities | 48 (46%) |
| Self-perceived knowledge of medication administration via EFT on a scale of 0 (= no knowledge) to 10 (= excellent knowledge), median (range) | 2 (0-9) |

Data are presented as n, unless indicated otherwise.

EFT, enteral feeding tube

ID, intellectual disability

From a maximum score of 15, the participating pharmacists obtained on average 5.2 (SD 2.6, range 0.0-12.0) or 35% (SD 18%, range 0%-80%). No significant differences in total scores were found for the investigated categorical variables (being consulted by EFT patients, postgraduate training received concerning medication administration via EFT, and use of information sources during questionnaire completion), nor did scatter plots show correlation between the continuous variables (age, work experience, and self-perceived knowledge) and total score. The proportion of pharmacists answering correctly to the individual questions is shown in Table 1. The guideline recommendations concerning water as the preferred flush solution (Q11) and the preparation of hard gelatin capsules (Q2) were known best. Least known items included: when to flush the EFT (Q10), the minimum recommended backrest elevation (Q13), and recognizing drugs with risk of poor bioavailability when administered through a jejunostomy tube (Q14).

Ten percent of the participants (11/105) reported to have used information sources during questionnaire completion, which included (i) an online database of the Belgian Centre for Pharmacotherapeutic Information ³ (n=4), (ii) an online Belgian database about crushing solid dosage forms ⁴ (n=4), (iii) the DelphiCare® database (a drug information database) ⁵ (n=2), (iv) Summary of Product Characteristics (n=1), (v) Handbook of Drug Administration via Enteral Feeding Tubes ² (n=1), and (vi) Google (n=1).

DISCUSSION

Main findings

Knowledge of pharmacists related to medication administration through EFT was poor. However, participants recognized their lack of knowledge (self-perceived knowledge of 2 on a 0-10 scale). Least known items were: (i) identifying medications that have a decreased bioavailability when administered through a jejunostomy tube; (ii) when to flush the EFT, which is an important measure to prevent tube blockage ²; and (iii) the minimum elevation of the patient's backrest, which is recommended to reduce reflux of the medication/flush solution ². A striking finding is that only a minority of participants was able to select suspensions, which need to be shaken before use to ensure correct dosing, out of a list of commercially available liquid dosage forms. One of the suspensions on this list was the frequently dispensed domperidone suspension Motilium®. Far better, yet still rather low, is the number of participants identifying all non-crushable drugs (i.e. the sustained release dosage forms Depakine Chrono® and Carbamazepine CR®, and the enteric coated Losec Mups®), hence suggesting a limited knowledge on solid dose formulation coding.

Interpretation of findings in relation to previous studies

Our results were comparable to the findings in other settings where it was reported that acute care nurses ⁶ and staff members of RCFs for people with ID (i.e. mainly non-medically educated staff ⁷ had insufficient knowledge related to medication administration through EFT as well. In their pre-post study *Dashti-Khavidaki et al.* ⁶ found that less than one third of the acute care nurses correctly responded to the questions dealing with the recognition of dosage forms, tube flushing, and medication preparation. In our previous study examining knowledge of staff members of RCFs for people with ID ⁷ a similar questionnaire was used. When comparing these results with the observation in the present study, pharmacists scored substantially better than RCF staff members on questions related to the crushability of tablets. The most surprising difference however was that pharmacists scored worse on the question dealing with the identification of suspensions in a list of commercially

available liquid dosage forms. Another important difference between these two samples was that, even though total scores were low in both samples, pharmacists knew they lack knowledge on this topic, whereas RCF staff members thought their knowledge was good.

Previous research in the hospital setting ^{6,8} and in an RCF for people with ID ⁹ has demonstrated that educational intervention programs led by (clinical) pharmacists improved practice and knowledge of personnel involved in medication preparation and administration to patients with EFT. However, when taking into account the findings in the present study, community pharmacists will need proper training before being able to provide qualitative education and advice on this topic.

Limitations

Main limitation of our study is that only a small number of pharmacists completed the questionnaire. The combination of a typically low response rate to web-questionnaires, the voluntary participation and hence high probability that mainly pharmacists that are interested in this topic participated in the questionnaire, make it difficult to generalise our findings to the wider pharmacist community. However, this limitation suggests that our data reflect an overestimation of knowledge amongst the general population of community pharmacists.

CONCLUSION

Our findings demonstrate that community pharmacists' knowledge on correct medication administration via EFT is too limited to be able to provide good advice to EFT patients or their caregivers. Tailored training on this topic is needed.

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Chapter 8: GENERAL DISCUSSION

MAIN FINDINGS

The aim of this thesis was to evaluate the current medication-related practices in Belgian RCFs. A first explorative study described the organisation of the medication management process (MMP) in RCFs for individuals with ID, and identified problem areas (Chapter 2). The main finding of this study was that the MMP in Belgian RCFs for people with ID is suboptimal, both at policy level and at unit level. Regarding the general aspects of the medication management, standard operating procedures (SOPs) concerning the MMP appeared to be unavailable in one third of the RCFs, about one quarter of the RCFs did not have a medication error reporting system, and only a minority systematically (i.e. at least annually) reviewed their MMP for failures. Regarding the practical organization of the MMP, we observed a large variability in procedures between the participating RCFs and even between units within the same RCF. Only a few of the participating RCFs appeared to be equipped with an electronic prescribing system, and the role of the pharmacist was mainly limited to delivery of medication. Medication was mostly administered by non-medically qualified staff, e.g. educators. Majority of the interviewed staff members reported having problems with medication preparation and administration within the RCF, and proposed education/sensitization of staff and improved communication between all stakeholders as part of the solution. Based on these findings, recommendations for improvement actions can be proposed: the use of SOPs and error reporting systems, a frequent (at least annual), proactive evaluation of the MMP, an expansion of the role of the pharmacist, and education and training of staff.

After this general, descriptive study, we further focussed on medication administration through EFT in this setting. In our study investigating drug administration practices to patients with EFT (Chapter 3), we found that current guidelines concerning medication preparation and administration through EFT are often not followed in Belgian RCFs for individuals with ID. Mixing together multiple drugs, not diluting liquid formulations with at least an equal amount of water, not shaking suspensions/emulsions before use, and not selecting the most appropriate dosage form were found to be the most common deviations from medication preparation guideline recommendations. For medication administration, not flushing the EFT with at least 15 mL water, not elevating the resident's backrest to at least 30°, and not rinsing the medicine cup were the most common deviations. As in Chapter 2, we observed high variability in working methods within the RCFs. This variability was seen even between staff members of the same unit.

As no data are available in literature on medication use through EFT in individuals with ID, we made an inventory of drugs that are routinely administered through EFT in people with ID in Belgian RCFs (Chapter 4). In this study, we found that in half of this patient population, more than six different drugs

were administered through the EFT. Antiepileptics, drugs for constipation, and drugs for acid related disorders were the most frequently used groups. Almost half of the screened medication records contained at least one potential DDI, with antiepileptics being involved in the 5 most frequently occurring potential DDIs. Since many of these commonly used drug classes require special attention in case of administration through EFT, adequate knowledge and correct medication administration practices are required to reduce the risk of medication errors.

Results from our observational study (Chapter 3) demonstrated that guidelines for the administration of medication through EFT are often not followed in RCFs for people with ID. Since insight into the possible barriers to adherence to guidelines may facilitate the implementation of guidelines in clinical practice, we investigated the barriers and facilitators experienced by RCF-staff members to following guidelines (Chapter 5). This qualitative study showed that time constraints, lack of knowledge, lack of clear administration instructions, lack of necessary materials, and limited gastric fluid tolerance in certain residents were perceived as barriers. Other influencing factors that emerged from the focus group interviews were the number of staff members involved in medication handling, the number of residents and number of drugs to be administered, habits, the residents' comfort and well-being, and safety. However, focus group participants were generally very receptive to the idea of implementing the guidelines in their daily practice. Several of these barriers can be tackled by relatively easy interventions. Priority should be given to the provision of necessary materials and clear administration instructions, and to the enhancement of knowledge.

In order to tailor interventions focusing on the enhancement of knowledge of RCF staff members on the administration of drugs through EFT, we first examined current knowledge of RCF staff members on this topic (Chapter 6). This study identified a substantial lack of knowledge of guidelines for drug administration through EFT among staff of RCFs for people with ID, with mean total scores <50%. Guideline recommendations regarding rinsing of the used medicine cup and preparation of hard gelatin capsules were known best. Those regarding the use of protective equipment when crushing toxic substances, crushing of sustained release and enteric coated dosage forms, elevation of the patient's backrest, and flushing of the EFT were known the least. Although mean total scores were low, RCF staff members rated their self-perceived knowledge in the upper end of the knowledge scale. These results emphasize the need for sensitization and education on this topic.

In our study on the MMP (Chapter 2), it was described that RCFs purchased their medication from a community pharmacy. Because of their drug knowledge and expertise, community pharmacists are ideally placed to provide education and advice on medication administration via EFT. Since their level of knowledge determines the quality of their advice, we assessed community pharmacists' actual knowledge on medication administration via EFT (Chapter 7). The results of this study demonstrate

that community pharmacists' knowledge on correct medication administration via EFT is too limited to be able to provide good advice to EFT patients or their caregivers. The guideline recommendations concerning water as the preferred flush solution and the preparation of hard gelatin capsules were known best. Least known items included: when to flush the EFT, the minimum recommended backrest elevation, and recognizing drugs with risk of poor bioavailability when administered through a jejunostomy tube. In contrast to RCF staff members, the participating community pharmacists knew they lack knowledge. Tailored training on this topic is needed.

IMPLICATIONS FOR PRACTICE

The findings of our research indicate that changes are recommended regarding different medication management aspects. Some initial steps towards optimization have already been taken. Based on the findings of our study on the MMP and recommendations from literature, we listed *recommendations* intended for direction and medical office of the RCF, and the delivering pharmacist (cfr. Appendix 3).

Recommendations towards direction and medical office of the RCF

Regarding medication management policy

First, to ensure the safe handling of medicines, it is recommended to develop comprehensive **policies and procedures** for the RCF's medication management ¹ (cfr. Chapter 2), and to distribute this information to all stakeholders. A description of the complete *MMP* should be included *in the quality handbook* of the RCF, including procedures concerning medication administration through EFT. This approach may stimulate compliance with current recommendations and improve medication administration practices. Organizations also need to ensure that medication-related policies are updated and that there are systems in place to ensure that (enteral) medication administration is conducted safely. Moreover, it has been found that simplification and standardization are effective as a forcing means by decreasing reliance on individualized decision-making. Several initiatives that standardized medication ordering and administration protocols, realized improvements in patient outcomes, nurse efficiency, and effectiveness ².

The implementation of an **error reporting system** is another recommended measure ^{1,3-5}. This system encourages staff members to voluntarily report medication errors (without punitive actions in the event of an error). A consistent analysis of the collected data can reveal aspects of the MMP that need to be changed to improve safety and reduce the risk of reoccurrence and of harm to the residents.

Third, the **MMP** should be **evaluated on an ongoing basis** for risk points, hence identifying areas that need to be adapted in order to improve safety ^{6;7}. A frequent (at least annual), proactive evaluation of the MMP involving all stakeholders (medical office employees, director, unit employees and pharmacist) is recommended. In addition, medical office staff members should observe regularly how medication is prepared and administered to the residents in order to verify whether protocols are followed and whether problems arise in practice.

Fourth, the **medication records** (MR) that are used for medication administration should be clear and univocal, detailing all medications and data necessary for safe medication administration. If the resident receives his medication through EFT, this should be clearly mentioned on the medication record (e.g. by using text or a pictogram). Computer-generated MRs guide drug administration far more safely than handwritten MRs. However, it is essential to ensure that the presentation is clear to the staff who will administer medication to the residents. Interdisciplinary meetings are needed to identify and prioritize MR format problems that could contribute to errors ⁸. Regarding fluid-restricted patients, restriction in fluid intake should be clearly mentioned on the MR. Since a balance must be found between the maximum fluid intake and the minimal volume required to dilute medications or to flush the EFT, this restriction should be discussed with the RCF's medical staff and other relevant stakeholders (e.g. dietician), and fixed volumes should be established for each individual of this special subpopulation.

Furthermore, medical office staff members should also provide adequate **information** concerning drugs and medication administration so they can consult these when necessary, and sufficient **materials** needed for medication administration (e.g. syringes) should be provided. Also **task division** concerning medication administration should be discussed. One could for example assign responsibility for medication preparation and administration to an extra staff member (as suggested by the focus group participants in Chapter 5). In case an extra staff member is unrealistic due to budgetary constraints, another approach could be to more efficiently organize the staff members' different tasks, including medication preparation and administration.

Regarding education

Attention for the **education** of RCF staff members may be important, since several of our studies demonstrated a need for education. In Chapter 2 the need for education on medication in general was mentioned by the interviewed staff members, whereas Chapter 3, 5 and 6 demonstrated a need for education on medication administration through EFT in particular. Without (updated) knowledge on medication administration (via EFT) and the possible consequences of non-adherence to current guidelines, patients can be exposed to serious unwanted effects or subtherapeutic doses.

We developed an *educational session* based on the current guidelines on medication administration through EFT, taking into account the educational qualifications in this setting (i.e. non-medical background) and using the findings of our studies on drug administration practices via EFT (Chapter 3), medication use (Chapter 4), the focus group findings (Chapter 5), and RCF staff members' knowledge (Chapter 6). An outprint of the powerpoint presentation is shown in Appendix 4. We also integrated the guidelines in a *flowchart*, which is depicted in Appendix 5. At the request of several RCFs, we made an *overview of drugs* for which the need for a *prolonged break in enteral feeding* has been demonstrated or the need for separate administration from other drugs is known (based on drug use data in Chapter 4), or for which specific advice regarding a break towards feeding is recommended (cfr. Appendix 6). Since leadership commitment and support is a prerequisite for successful implementation of guideline recommendations ², the content of the educational session was first discussed with the RCF staff responsible for medication administration via EFT (before presenting it to all staff members), and the advices and flowchart were handed.

However, some **complicating factors** arise with regard to education. An educational intervention on good medication administration practices through EFT can only be successful if the RCF staff is willing to *change their behaviour*. Since medication-related courses have been very limited in the curricula of educators and care aids, they act as they were taught on the job and as they have seen others perform before them. Therefore, it is difficult to change behaviours that are very well embedded in daily practice. Following current guidelines on medication administration through EFT often means changing a routine and it is very tempting to fall back in the old habits after a while ⁹. In addition, there is a *high rate of staff turnover* in this setting ^{10,11}. Therefore, it is important to repeat educational sessions on a regular basis (e.g. every year), and to evaluate systematically drug administration practices through EFT and staff's knowledge on this topic.

Repeating these educational sessions is important in Belgian RCFs for people with ID, since it is **typical** for this setting that medication often is administered by **non-medically trained staff members** such as educators and care aids (cfr. Chapter 2 & 6). Nevertheless, Belgian law ¹² states that only trained nurses can perform nursing interventions like medication administration. According to the Flemish Welfare Association (i.e. an association that assembles services from 5 major welfare work sectors among which care of the disabled) three main reasons for the limited number of trained nurses in RCFs for people with an ID are: (i) staffing standards that are not adjusted to the current care needs, (ii) the lower salary in these RCFs than in hospitals, and (iii) shortage of qualified nurses in general. Therefore, non-medically qualified staff members are involved in medication administration, which further increases the risk for medication errors. This emphasizes the need to educate staff members. Education on medication-related topics, such as medication administration, could be organized by the

RCFs and should be a requirement before being allowed to administer medication to residents. Furthermore, courses dealing with medication administration practices could also be included in the curricula of future staff members (in theoretical and practical courses).

Recommendations towards the delivering pharmacist

Because of their specific medication-related expertise concerning drug formulations, adverse effects, etc., community pharmacists may be ideally placed to **provide training and advice** in institutions they supply. Therefore, educational sessions on medication administration through EFT for example, can be provided by the delivering pharmacist. However, pharmacists that participated in our questionnaire study on medication administration through EFT (Chapter 7) indicated a need for training/update on medication administration via EFT, didactic materials and access to practical information sources (e.g. book, website) before being confident about providing training on this topic in RCFs. Therefore, education needs to be provided for pharmacists, as well as solid support under the form of up-to-date ready-to-use educational packages, including a PowerPoint® presentation and flowchart. These can be provided and updated by either the University or a professional association of pharmacists.

Next to providing education and reviewing patients' drug therapy, delivering *community pharmacists* can provide a number of other pharmaceutical care services. These may include organizing regular meetings to discuss medication-related problems, participation in the proactive evaluation of the MMP involving all stakeholders (medical office employees, director, unit employees, and pharmacist), participation in appropriate organizational committees of the RCF, and working with physicians, nurses, administrators, and others to examine and improve systems to ensure that medication processes are safe. The pharmacist should also register which patients receive their medication through EFT in the pharmacy information system in order to be able to provide tailored care.

In order to establish a widespread implementation, initiatives should be taken on a legal level. Quality indicators should be set up, taking into account the findings of this thesis. These quality indicators could help the RCFs in optimizing medication administration practices, since they provide a measurable and standardized objective for the quality of different aspects of medication policy. Further, a framework will be needed to support RCFs in meeting these indicators, hence optimizing the medication policy.

FUTURE RESEARCH OPPORTUNITIES

First, the *effect of the educational intervention* in this setting of RCFs for people with ID needs to be assessed. This can be performed by retaking measurement of current deviations from guidelines concerning medication administration via EFT (cfr. Chapter 3), and by examining anew knowledge of RCF staff members (cfr. Chapter 6).

Second, more *research* is needed *into the evidence supporting each recommendation* concerning medication administration through EFT. The A.S.P.E.N. guidelines¹³, on which our research was based, classified each recommendation according to the available evidence. Majority of the guidelines were attributed grade B, meaning there is fair research-based evidence to support the guideline (well-designed studies without randomization)¹³. However, in Chapter 1 it also became clear that some of the current guidelines are not based on hard evidence, but rather on expert opinion (e.g. the recommendation to use syringes of at least 30 mL). Trials should be conducted to investigate these expert-based recommendations in order to provide research-based evidence. Hence, health care professionals may be supported in their effort to optimize medication administration through EFT.

In light of fluid restricted individuals taking multiple medications, it would be worthwhile to *investigate the possibility of combining drugs* for administration through EFT. Yet, this approach is rather hard to investigate, since not only the actvum, but also excipients can have an important influence, which further complicates prediction of stability and compatibility of mixtures.

Third, in order to optimize drug use in RCFs for people with ID, regularly *reviewing drug therapy* may be an effective intervention. In the elderly, the structured medication review, performed jointly by the physician, the pharmacist and the patient, proved to be an effective intervention to improve pharmacotherapy and prevent harmful effects¹⁴⁻¹⁷. As polypharmacy and chronic drug use are common factors in both the elderly population and in people with ID, a structured medication review could also be an effective intervention in this population. Scheifes et al. recently demonstrated this in people with ID and behavioural problems, proving that a structured medication review is a valuable instrument to optimize pharmacotherapy¹⁸. Similarly, future research could explore the effect of conducting structured medication reviews in the general population of individuals with ID, and in the subpopulation of individuals receiving medication through EFT. In order to have a clear picture of the patient's situation, it is recommended to review the drug therapy in an interdisciplinary team, including all appropriate stakeholders (i.e. treating physician, medical office staff, dietician, living unit staff, delivering pharmacist,...). Participation of the patients in the medication review process is essential¹⁸, yet problematic in this population. Because of their lack of communication skills, disorders

and (side)effects are typically hard to diagnose in individuals with ID, which complicates drug therapy review. Therefore, involvement of living unit staff and parents or other family members is essential.

Finally, our research only focused on individuals with ID (and possible other comorbidities) living in RCFs. However, since medication administration through EFT is prone to errors, care for individuals with ID and EFT in *other settings* should be explored as well. For example, individuals with ID and EFT are also often cared for at home (e.g. during weekends), with even less medically trained caregivers being responsible for medication administration.

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Summary

Given the vulnerability of people with intellectual disabilities (ID), the lack of data on the medication management and the complex and difficult matter of medication administration via enteral feeding tube (EFT), the aim of this doctoral research was to evaluate the current medication-related practices in Belgian RCFs. To answer this question, we have proceeded in phases, starting with a descriptive study of the medication management process and with a descriptive study of medication administration via EFT, before undertaking any further steps.

In **Chapter 2**, the **organization of the medication management process (MMP) in RCFs for individuals with ID** was described. For this explorative study, structured interviews were performed, using a questionnaire addressed to the RCF director (on administrative and policy issues), the unit employees and medical office employees (on the practical aspects of the MMP), and physicians (on the physician's role in the MMP, the therapeutic drug formulary, and communication with staff and delivering pharmacist). Main finding of this study was that the MMP in Belgian RCFs for people with ID is suboptimal, both at policy level and at unit level. Regarding the general aspects of the medication management, standard operating procedures (SOPs) concerning the MMP appeared to be unavailable in one third of the RCFs, about one quarter of the RCFs did not have a medication error reporting system, and only a minority systematically (i.e. at least annually) reviewed their MMP for failures. Regarding the practical organization of the MMP, we observed a large variability in procedures between the participating RCFs and even between units within the same RCF. Only a few of the participating RCFs appeared to be equipped with an electronic prescribing system, and the role of the pharmacist was mainly limited to delivery of medication. Medication was mostly administered by non-medically qualified staff, e.g. educators. Majority of the interviewed staff members reported having problems with medication preparation and administration within the RCF, and proposed education/sensitization of staff and improved communication between all stakeholders as part of the solution. Based on these findings, recommendations for improvement actions can be proposed: the use of SOPs and error reporting systems, a frequent (at least annual), proactive evaluation of the MMP, an expansion of the role of the pharmacist, and education and training of staff.

Because of the complexity of medication administration through EFT, we further focussed our research on this topic. First, we conducted an **observational study investigating drug administration practices to patients with EFT (Chapter 3)**. We found that current guidelines concerning medication preparation and administration through EFT are often not followed in the Belgian RCFs for people with ID. Mixing together multiple drugs, not diluting liquid formulations with at least an equal amount of water, not shaking suspensions/emulsions before use, and not selecting the most appropriate dosage form were found to be the most common deviations from medication preparation guideline recommendations. For medication administration, not flushing the EFT with at least 15 mL water, not elevating the

resident's backrest to at least 30°, and not rinsing the medicine cup were the most common deviations. Similar to the findings of our previous study on the MMP (Chapter 2), we observed high variability in working methods within the RCFs regarding medication administration through EFT. This variability was seen even between staff members of the same unit.

As no data are available in literature on medication use through EFT in individuals with ID, we made an **inventory of drugs that are routinely administered through EFT in people with ID in Belgian RCFs (Chapter 4)**. We found that in half of the studied patient population, more than six different drugs were administered through the EFT. Antiepileptics, drugs for constipation, and drugs for acid related disorders were the most frequently used groups. Almost half of the screened medication records contained at least one potential DDI, with antiepileptics being involved in the 5 most frequently occurring potential DDIs. Since many of these commonly used drug classes require special attention in case of administration through EFT, adequate knowledge and correct medication administration practices are required to reduce the risk of medication errors.

In Chapter 3 we found that guidelines for the administration of medication through EFT are often not followed in RCFs for people with ID. Since insight into the possible barriers to adherence to guidelines may facilitate the implementation of guidelines in clinical practice, we investigated the **barriers and facilitators experienced by RCF-staff members to following guidelines (Chapter 5)**. Therefore, we conducted a qualitative study, using focus groups. This qualitative study revealed that time constraints, lack of knowledge, lack of clear administration instructions, lack of necessary materials, and limited gastric fluid tolerance in certain residents were perceived as barriers. Other influencing factors that emerged from the focus group interviews were the number of staff members involved in medication handling, the number of residents and number of drugs to be administered, habits, the residents' comfort and well-being, and safety. However, focus group participants were generally very receptive to the idea of implementing the guidelines in their daily practice. Several of these barriers can be tackled by relatively easy interventions. Priority should be given to the provision of necessary materials and clear administration instructions, and to the enhancement of knowledge.

Subsequently, we examined **current knowledge of RCF staff members** on the administration of drugs through EFT (**Chapter 6**) in order to be able to tailor interventions focusing on the enhancement of knowledge of RCF staff members on this topic. This study identified a substantial lack of knowledge of guidelines for drug administration through EFT among staff of RCFs for people with ID, with mean total scores <50%. Guideline recommendations regarding rinsing of the used medicine cup and preparation of hard gelatin capsules were known best. Those regarding the use of protective equipment when crushing toxic substances, crushing of sustained release and enteric coated dosage forms, elevation of the patient's backrest, and flushing of the EFT were known the least. Although mean total scores were

low, RCF staff members rated their self-perceived knowledge in the upper end of the knowledge scale. These results emphasize the need for sensitization and education on this topic.

As reported in our study on the MMP (cfr. Chapter 2), RCFs purchase their medication from a community pharmacy. Because of their drug knowledge and expertise, community pharmacists may be ideally placed to provide education and advice on medication administration via EFT. Since their level of knowledge determines the quality of their advice, we assessed **community pharmacists' actual knowledge on medication administration via EFT (Chapter 7)**. This study showed that community pharmacists' knowledge on correct medication administration via EFT is too limited to be able to provide good advice to EFT patients or their caregivers. The guideline recommendations concerning water as the preferred flush solution and the preparation of hard gelatin capsules were known best. Least known items included: when to flush the EFT, the minimum recommended backrest elevation, and recognizing drugs with risk of poor bioavailability when administered through a jejunostomy tube. In contrast to RCF staff members, the participating community pharmacists knew they lack knowledge. Tailored training on this topic is needed.

In **conclusion**, this doctoral thesis has demonstrated a substantial room for improvement in both the MMP and medication administration through EFT in RCFs for people with ID. Enhancing knowledge and implementing current medication administration guidelines are a few of the first essential steps to optimize care for this vulnerable patient population. However, policy changes, continued education, an extended role of the delivering pharmacist, and further research are needed in order to establish improved medication-related care in daily practice in this setting.

Samenvatting

Omwille van de kwetsbaarheid van personen met een mentale beperking, het gebrek aan gegevens omtrent medicatiebeleid in de zorg voor deze populatie, en de complexe en moeilijke kwestie van medicatietoediening via enterale sonde, was het doel van deze thesis om de huidige medicatiegerelateerde praktijk in Belgische residentiële instellingen voor personen met een mentale beperking te evalueren. Daarvoor hebben we in verschillende fases gewerkt, startend met een beschrijving van het geneesmiddelenproces en met een beschrijvende studie van medicatietoediening via sonde.

In **hoofdstuk 2** werd de **organisatie van het geneesmiddelenproces in instellingen voor personen met een mentale beperking** beschreven. Voor deze verkennende studie werden aan de hand van een vragenlijst gestructureerde interviews gevoerd met de directie van de instelling (m.b.t. administratieve en beleidszaken), met personeelsleden van de leefgroep en medische dienst (m.b.t. de praktische aspecten van het geneesmiddelenproces), en met de arts (m.b.t. de rol van de arts in de instelling, het geneesmiddelenformularium, en communicatie met personeel en toeleverende apotheker). De belangrijkste bevinding van deze studie was dat het geneesmiddelenproces in Belgische instellingen voor personen met een mentale beperking suboptimaal is, zowel op beleidsniveau als op leefgroepe-niveau. Met betrekking tot de algemene aspecten van het medicatiebeleid, bleken protocollen omtrent het geneesmiddelenproces niet beschikbaar in een derde van de deelnemende instellingen, ongeveer een kwart van de instellingen had geen foutenrapporteringssysteem, en enkel een minderheid evalueerde systematisch (i.e. minstens jaarlijks) het geneesmiddelenproces met oog op verbeteracties. Betreffende de praktische organisatie van het geneesmiddelenproces, zagen we een grote variatie in procedures tussen de deelnemende instellingen, en zelfs tussen de leefgroepen in eenzelfde instelling. Slechts enkele van de deelnemende instellingen beschikten over een elektronisch voorschrijfsysteem, en de rol van de apotheker bleek hoofdzakelijk beperkt tot het leveren van de medicatie. De meerderheid van de geïnterviewde personeelsleden rapporteerde problemen te ondervinden bij de voorbereiding en toediening van medicatie in de instelling, en stelde opleiding en sensibilisering van het personeel voor, evenals betere communicatie tussen alle niveaus als deel van de oplossing. Op basis van de bevindingen in deze studie kunnen verbeteracties worden voorgesteld: het gebruik van protocollen, het invoeren van een foutenrapporteringssysteem, het uitvoeren van een regelmatige (minstens jaarlijks), proactieve evaluatie van het geneesmiddelenproces, uitbreiding van de rol van de toeleverende apotheker, en opleiding van het personeel.

Door de complexiteit van medicatietoediening via enterale sonde, hebben we ons onderzoek verder gericht op dit onderwerp. Eerst hebben we een observationele studie uitgevoerd die onderzocht **hoe medicatie wordt voorbereid en toegediend aan bewoners met een enterale sonde (hoofdstuk 3)**. We vonden dat de huidige aanbevelingen omtrent de voorbereiding en toediening van medicatie via sonde

vaak niet gevolgd worden in Belgische instellingen voor personen met een mentale beperking. Het mengen van verschillende geneesmiddelen, niet verdunnen van vloeibare medicatie met minstens een gelijke hoeveelheid water, niet schudden van suspensies/emulsies voor gebruik, en het niet kiezen van de meest geschikte toedieningsvorm waren de meest voorkomende afwijkingen van de aanbevelingen over medicatievoorbereiding. In verband met medicatietoediening waren het niet spoelen van de sonde met minstens 15 mL water, niet verhogen van de rugleuning van de bewoner tot minstens 30°, en niet spoelen van het gebruikte medicatiepotje de meest voorkomende afwijkingen. Gelijkaardig aan de bevindingen uit onze algemene studie over het geneesmiddelenproces (hoofdstuk 2), zagen we een grote variatie in werkwijzen omtrent medicatietoediening via sonde binnen eenzelfde instelling. Deze variatie werd zelfs opgemerkt tussen personeelsleden van eenzelfde leefgroep.

Aangezien er in de literatuur geen gegevens beschikbaar zijn over het medicatiegebruik via enterale sonde bij personen met een mentale beperking, hebben we nagegaan **welke geneesmiddelen vaak worden toegediend via sonde aan personen met een mentale beperking in Belgische instellingen (hoofdstuk 4)**. We vonden dat bij de helft van de bestudeerde populatie meer dan 6 verschillende geneesmiddelen werden toegediend via sonde. Antiepileptica, laxativa en geneesmiddelen voor maagzuur-gerelateerde aandoeningen waren de meest frequent gebruikte geneesmiddelenklassen. Bijna de helft van de gescreende medicatiefiches bevatte minstens 1 potentiële geneesmiddeleninteractie; de antiepileptica waren betrokken bij de 5 meest voorkomende potentiële interacties. Veel van de frequent gebruikte geneesmiddelenklassen vereisen speciale aandacht bij toediening via sonde, waardoor een goede kennis en een correcte voorbereiding en toediening van medicatie vereist zijn om het risico op medicatiefouten te reduceren.

In hoofdstuk 3 vonden we dat de aanbevelingen omtrent medicatietoediening via sonde vaak niet gevolgd worden in instellingen voor personen met een mentale beperking. Aangezien inzicht in de mogelijke barrières voor het volgen van de aanbevelingen de implementatie van deze aanbevelingen in de praktijk kan vergemakkelijken, hebben we onderzocht **welke barrières en facilitatoren de personeelsleden van de instelling ondervinden voor het volgen van de aanbevelingen (hoofdstuk 5)**. Hiervoor hebben we een kwalitatief onderzoek gevoerd, gebruik makend van focusgroepen. Dit kwalitatief onderzoek wees uit dat volgende zaken als barrières werden gezien: tijdsgebrek, gebrek aan kennis, gebrek aan duidelijke medicatietoedieningsinstructies, gebrek aan materiaal, en de vloeistofbeperking die van toepassing is bij sommige bewoners. Andere beïnvloedende factoren die tijdens de focusgroepgesprekken werden vermeld, waren het aantal personeelsleden betrokken bij medicatiehandelingen, aantal bewoners en aantal toe te dienen geneesmiddelen, gewoonten, comfort en welzijn van de bewoners, en veiligheid. Nochtans stonden de deelnemers van de focusgroepen ervoor open om de aanbevelingen te (proberen) implementeren in hun dagelijkse praktijk.

Verschillende van deze barrières kunnen aangepakt worden met relatief eenvoudige interventies. Men zou prioriteit moeten geven aan het voorzien van het nodige materiaal en duidelijke instructies/protocollen omtrent medicatietoediening, en aan het verbeteren van de kennis.

Vervolgens hebben we onderzocht wat de **huidige kennis** is van de **personeelsleden van instellingen voor personen met een mentale beperking omtrent medicatietoediening via sonde (hoofdstuk 6)**.

Op die manier kunnen interventies die focussen op het verbeteren van de kennis van het personeel omtrent dit onderwerp, hieraan aangepast worden. In deze studie constateerden we dat er een aanzienlijk gebrek is aan kennis betreffende de aanbevelingen voor medicatietoediening via sonde onder personeelsleden van instellingen voor personen met een mentale beperking. De gemiddelde totale scores waren lager dan 50%. De aanbevelingen omtrent het spoelen van het gebruikte medicatiepotje en de voorbereiding van harde gelules waren best gekend. Die met betrekking tot het gebruik van beschermende kledij bij pletten van toxische stoffen, pletten van sustained release en enterisch omhulde preparaten, het verhogen van de rugleuning van de patiënt, en spoelen van de sonde waren minst gekend. Niettegenstaande de gemiddelde totaalscores laag waren, schatten de personeelsleden hun eigen kennis vrij hoog in (7 op een schaal van 0-10). Deze resultaten benadrukken de nood aan sensibilisering en opleiding over dit onderwerp.

Zoals beschreven in onze studie over het geneesmiddelenproces (cfr. Hoofdstuk 2), halen instellingen voor personen met een mentale beperking hun medicatie bij officina-apotheken. Als geneesmiddelenexpert kan de officina-apotheker de geschikte persoon zijn om opleiding en advies te geven over medicatietoediening via sonde. Aangezien het niveau van hun kennis de kwaliteit van hun advies bepaalt, hebben we de **parate kennis van officina-apothekers omtrent medicatietoediening via sonde** onderzocht (**hoofdstuk 7**). Deze studie toonde aan dat de kennis van officina-apothekers over het correct toedienen van medicatie via sonde te beperkt is om goed advies te kunnen geven aan sondepatiënten of hun mantelzorgers. De aanbevelingen betreffende water als de voorkeursspoelvloeistof en de voorbereiding van hard gelules waren best gekend. De minst gekende items waren: wanneer de sonde spoelen, de minimum aanbevolen verhoging van de rugleuning, en herkennen van geneesmiddelen met risico op verminderde biologische beschikbaarheid wanneer toegediend via jejunale sonde. In tegenstelling tot personeelsleden van instellingen voor personen met een mentale beperking, wisten de deelnemende officina-apothekers dat ze een tekort hebben aan kennis. Aangepaste opleiding over dit onderwerp is nodig.

We kunnen besluiten dat deze thesis heeft aangetoond dat er nog veel ruimte is voor verbetering met betrekking tot het geneesmiddelenproces en medicatietoediening via enterale sonde in instellingen voor personen met een mentale beperking. Het verbeteren van de kennis en implementatie van de huidige aanbevelingen betreffende medicatietoediening zijn enkele van de eerste essentiële stappen

in het verbeteren van de zorg voor deze kwetsbare populatie. Beleidsveranderingen, voortgezette opleiding, een meer uitgebreide rol van de toeleverende apotheker en verder onderzoek zijn nodig om verbeterde medicatie-gerelateerde zorg te kunnen bekomen in de dagelijkse praktijk van deze setting.

APPENDICES

APPENDIX 1: QUESTIONNAIRE ON THE MEDICATION MANAGEMENT PROCESS

| |
|---------------------------|
| Vragenlijst voor directie |
|---------------------------|

Functie van de bevrage:

Datum bevrage:

Tijdstip aanvang interview:

1. Algemeen

- a. Onder welk beheer valt de instelling? *overheid/privé/vzw...*

.....

- b. Op welke basis wordt de instelling gesubsidieerd?

.....

- c. Welke types beperkingen worden in de instelling opgenomen? Hoeveel per type?

| Type beperking | Aantal |
|----------------|--------|
| | |
| | |
| | |
| | |
| | |
| | |
| | |

enkelvoudige beperking – meervoudige beperking – NAH – licht verstandelijke beperking (IQ 60-75) – matig verstandelijke beperking (IQ 40-59) – ernstig verstandelijke beperking (IQ 20-39) – diep verstandelijke beperking (IQ < 20) – visuele / auditieve beperking – fysieke beperking (= ook chronische ziekte zoals epilepsie) – psychiatrische stoornissen – gedragsstoornissen

- d. Welke verschillende verblijfsvormen zijn er in de instelling? Hoeveel bewoners en hoeveel plaatsen zijn er respectievelijk per verblijfsvorm?

| Verblijfsvorm | Aantal |
|---------------|--------|
| | |
| | |
| | |
| | |
| | |
| | |

- dagopvang – semi-internaat – enkel ondersteuning overdag

- dagcentrum = dagbesteding voorzien

- internaat = voor kinderen

- kortverblijf

- tehuis voor werkenden

- *tehuis voor niet-werkenden of bezigheidstehuis= gezinsvervangende instellingen die permanente opvang, begeleiding, behandeling en verzorging bieden aan volwassen gehandicapte personen die niet bekwaam zijn om te werken. Arbeidsvervangende activiteiten en het aanleren en onderhouden van diverse vaardigheden worden aangeboden volgens individuele capaciteiten.*

- *tehuis voor niet-werkenden of nursingtehuis=indien thuis wonen als gevolg van een ernstig of diep mentale handicap, eventueel met bijkomende lichamelijke of psychische problemen onmogelijk wordt en ook aanvullende hulp niet meer voldoende is, kan opname in een nursingtehuis een oplossing zijn.*

- *geïntegreerd wonen=onderdeel van een tehuis voor niet-werkenden die zelfstandig proberen te wonen; vanuit tehuis voor niet-werkenden worden kleine groepswoningen opgericht*

- *ambulante zorg of dienstverlening = beschermd wonen - begeleid wonen=enkele uren per dag ambulante zorgen*

e. Bestaan er criteria om bewoners onder te brengen in bepaalde afdelingen?

Op basis van de soort beperking/leeftijd/IQ/zorgbehoeften/eis van de ouders...

.....
.....

f. Hoe wordt de instelling georganiseerd? Beschrijf dit in een organigram

Leefgroepen/afdelingen/personeel/bestuur...

g. Aantal werknemers (in Full Time Equivalenten én in aantal koppen)?

| | In Full Time Equivalenten | In aantal koppen |
|------------------|------------------------------|------------------|
| Verpleegkundigen | | |
| Verzorg(st)ers | | |
| Opvoeders | | |
| Artsen | | |
| Andere, nl. | | |

h. Is er een algemeen kwaliteitssysteem aanwezig? Ja/nee

Kwaliteitssysteem = gedetailleerde beschrijving van hoe werkzaamheden bij het geneesmiddelengebruik moeten worden uitgevoerd. In een kwaliteitssysteem wordt de werkwijze op de organisatie afgestemd.

i. Indien niet, waarom niet?

onmacht/tijdsgebrek/geldgebrek/personeelsgebrek/geen geschikte persoon om zich daarmee bezig te houden /niet gekend/onwil/ ...

ii. Indien wel,

1. Waarop is dit kwaliteitssysteem gebaseerd?

vb. ISO- norm=internationale norm voor de kwaliteitsmanagementsystemen en beschrijft de normen voor het kwaliteitsmanagementsysteem, model kwaliteitssysteem gehandicaptenzorg...

*In Nederland = model kwaliteitssysteem gehandicaptenzorg – harmonisatie kwaliteitsbeoordeling in de gehandicaptenzorg
In België? EFQM?*

2. Is dit systeem gecertificeerd? Ja/nee

Certificatie= externe audit door een certificatie-instelling waarbij wordt gecheckt of de organisatie aan alle normen voldoet

3. Wordt dit systeem ook effectief geïmplementeerd? Ja/nee

a. Indien niet, waarom niet?

onwil /onmacht/tijdsgebrek/ geldgebrek/personeelsgebrek/niet toepasbaar in de instelling in praktijk

4. Wordt dit systeem intern geëvalueerd? Waarom (niet)?

.....
.....
.....

2. Geneesmiddelenbeleid

a. Zijn er afspraken rond het geneesmiddelenproces die schriftelijk zijn vastgelegd?

Ja/nee

i. Zo ja, waarin werden deze afspraken vastgelegd?

1. In een algemeen kwaliteitshandboek met procedures voor de instelling
2. In aparte werkinstructies voor het geneesmiddelenproces
3. Andere, nl

ii. Op welk niveau gelden deze afspraken?

1. Afspraken voor de overkoepelende organisatie
2. Afspraken op instellingsniveau
3. Afspraken op niveau van een afdeling/leefgroep

iii. Worden deze afspraken regelmatig aangepast? Ja/nee

Zo ja,

1. Zijn werknemers (verpleegkundigen, opvoeders,...) betrokken bij deze aanpassingen? Ja/nee
2. Hoe wordt de aanpassing van het protocol aan de werknemers voorgesteld?
 - a. Via schriftelijke procedure
 - b. Via overleg
 - c. Niet
 - d. Andere
3. Vermelding herziene versie/versienummer op schriftelijke afspraken? Ja/nee
4. Datum aanpassing aanwezig op schriftelijke afspraken? Ja/nee
5. Andere vermelding, nl.
- b. Is er in de instelling iemand verantwoordelijk voor de controle van de kwaliteit van het geneesmiddelenbeleid? Ja/nee
 - i. Zo ja, wie is die verantwoordelijke?
 1. Kwaliteitscoördinator
 2. Arts
 3. Apotheker
 4. Opvoeder
 5. Verpleegkundige
 6. Werkgroep (bestaande uit.....)
 7. Andere, nl.

3. Artsen

- a. Hoeveel artsen zijn met de instelling verbonden?
 - Instellingsartsen?
 - Bezoekende artsen?
- i. Indien instellingsarts aanwezig:
 1. Hoe vaak is er een instellingsarts in de instelling aanwezig?
 - a.u/week
 - b.halve dagen/week
 - c. Andere, nl. ...
 2. Worden de bewoners nog door andere artsen dan de instellingsartsen behandeld? Ja/nee

4. Toeleverende apotheker

- a. De toeleverende apotheker wordt gekozen op basis van: (1=belangrijkste reden, 2=minder belangrijk,...)
 - O Nabijheid
 - O Aantal leveringen/dag

- O Prijs
- O Gewoonte
- O Andere, nl.

- b. Is er voor geneesmiddelen een aankooppolitiek waarin prijsconcurrentie een rol speelt?
 - i. Nee
 - ii. Ja, informeel
 - iii. Ja, via openbare aanbesteding

Tijdstip einde interview

Opmerkingen te noteren door de enquêteur op vraag van de geïnterviewde:

| |
|-------------------------------------|
| Vragenlijst voor afdeling/leefgroep |
|-------------------------------------|

Functie van de bevrager:

Datum bevraging:

Tijdstip aanvang interview:

1. Algemeen

- a. Type afdeling/leefgroep?
- b. Aantal bewoners in deze afdeling/leefgroep?
- c. Gemiddelde leeftijd ongeveer van de bewoners?
En min-max leeftijd?

2. Werkinstructies geneesmiddelenproces

Zijn er geschreven werkinstructies of is er een kwaliteitshandboek aanwezig?

☐ Ja

☐ op de afdeling

☐ in de instelling

☐ Nee

☐ Weet het niet

- a. Zo ja, wordt dit effectief geraadpleegd?

☐ Ja

☐ Nee

☐ Weet het niet

- i. Zo ja, wat staat hierin beschreven?

1. Afspraken met toeleverende apotheek (vb. beurtrol, wachtdienst...)
2. Afspraken met artsen mbt voorschrijven/wijzigen van medicatie
3. Opstellen van medicatiefiches/medicatieoverzichten
4. Wijze van aanvragen/bestellen van geneesmiddelen
5. Beheer en opslag van geneesmiddelen
6. Beheer van vervallen/overtollige geneesmiddelen
7. Beheer van verdovende middelen
8. Omgaan met verlosmedicatie (vb. wanneer de bewoner voor korte tijd naar huis gaat)
9. Uitzetten van geneesmiddelen (vb. max. voorbereidingstijd)
10. Bedelen/verstrekken van geneesmiddelen
11. Toedienen van injecties (vb. spuit met opgetrokken vloeistof niet laten liggen)
12. Toedienen van geneesmiddelen via sonde
13. Toedienen van niet-voorschriftplichtige geneesmiddelen in acute situaties zonder raadplegen van arts (vb. bij acute pijn)
14. Afspraken ivm fouten
15. Andere, nl. ...

3. Geneesmiddelenformularium

- a. Is er een formularium aanwezig op de afdeling?
 - i. Ja, elektronisch/gedrukt
 - ii. Nee
 - iii. Weet het niet
- b. Wordt het formularium voor het voorschrijven ook effectief gebruikt op de afdeling?
 - i. Nooit
 - ii. Sporadisch
 - iii. Systematisch
 - iv. Geen formularium aanwezig
 - v. Weet het niet
- c. Wordt een nieuwe behandelende arts bij een eerste bezoek op de hoogte gesteld van het formularium?
 - i. Nooit
 - ii. Sporadisch
 - iii. Systematisch
 - iv. Geen formularium aanwezig
 - v. Weet het niet
- d. Kan de behandelende arts buiten het formularium voorschrijven zonder dit te motiveren?
 - i. Ja
 - ii. Nee
 - iii. Geen formularium aanwezig
 - iv. Weet het niet
- e. Wijst u de behandelende arts op het feit dat hij/zij buiten het formularium voorschrijft?
 - i. Nooit
 - ii. Sporadisch
 - iii. Systematisch
 - iv. Geen formularium aanwezig
 - v. Weet het niet

4. Communicatie tussen behandelende artsen en verpleegkundigen/opvoeders in verband met het voorschrijven

- a. Op welke manier worden geneesmiddelen voorgeschreven in de instelling?
 - i. Manueel
 - 1. Herhaalvoorschriften
 - ☐ geschreven door verpleegkundige/opvoeder en gehandtekend door arts
 - ☐ door arts geschreven en gehandtekend
 - 2. Nieuwe voorschriften

- O door verpleegkundige/opvoeder geschreven en door arts gehandtekend
 - O door arts geschreven en gehandtekend
 - 3. Andere, nl. ...
- ii. Elektronisch
 - 1. Herhaalvoorschriften
 - O automatisch naar apotheek gestuurd
 - O door verpleegkundige/opvoeder in de computer ingevoerd en bevestigd door arts
 - O door arts persoonlijk in de computer ingevoerd en bevestigd
 - 2. Nieuwe voorschriften
 - O door verpleegkundige/opvoeder in de computer ingevoerd en bevestigd door arts
 - O door arts persoonlijk in de computer ingevoerd en bevestigd
 - 3. Andere, nl. ...
- b. Hoe verloopt de procedure voor het opstarten/wijzigen/stoppen van medicatie?
 - i. De arts communiceert dit en bezorgt het nieuwe voorschrift aan de verantwoordelijke verpleegkundige van de afdeling
 - ii. De arts laat een nota achter in het dossier van de bewoner
 - iii. Andere, nl.
- c. Wanneer er een nieuw geneesmiddel wordt voorgeschreven, waar komen deze gegevens terecht?
 - i. In het verpleegkundig dossier
 - ii. In het medisch dossier
 - iii. Andere, nl.
- d. Wordt de medicatiefiche geëvalueerd met de behandelende arts? (Hiermee wordt een grondige herziening van de medicatie bedoeld, om na te gaan of de geneesmiddelen nog steeds geïndiceerd zijn, de dosis en de vorm eventueel dient aangepast te worden, en of er geneesmiddelen moeten toegevoegd worden)
 - i. Nee
 - ii. Ja, sporadisch (vb. wanneer er problemen zijn)
 - iii. Ja, systematisch (minstens om de 6 maanden), namelijk iedere maanden
 - 1. Indien ja, wie is betrokken bij deze evaluatie? (meerdere antwoorden mogelijk)
 - a. Apotheker
 - b. Hoofdverpleegkundige
 - c. Verpleegkundige
 - d. Instellingsarts
 - e. Opvoeder
 - f. Andere, nl.

5. Medicatieoverzicht of medicatiefiche

- a. Wie doet meestal de medicatieanamnese bij opname van een nieuwe bewoner?
 - i. Arts
 - ii. Hoofdverpleegkundige
 - iii. Verpleegkundige
 - iv. Opvoeder
 - v. Andere, nl. ...
- b. Wordt voor elke bewoner op deze afdeling een medicatiefiche gemaakt?
 - i. Nee, voor geen enkele bewoner
 - ii. Ja, voor de meeste bewoners
 - iii. Ja, voor alle bewoners
- c. Indien een medicatiefiche wordt aangemaakt, door wie wordt deze aangemaakt?
 - i. Apotheker
 - ii. Arts
 - iii. Hoofdverpleegkundige
 - iv. Verpleegkundige
 - v. Opvoeder
 - vi. Andere, nl.
- d. Indien een medicatiefiche wordt aangemaakt, hoe wordt deze aangemaakt?
 - i. Manueel
 - ii. Elektronisch via een zelf ontwikkeld model (bv. Met Excel)
 - iii. Elektronisch via een model van een softwarehuis (naam software:
.....)
 1. Indien elektronisch, is de informatisering beperkt tot enkel de medicatiefiche of maakt de elektronische medicatiefiche deel uit van het elektronisch zorgdossier?
 - a. Enkel medicatiefiche is elektronisch
 - b. Volledig zorgdossier is elektronisch
- e. Welke elementen bevat deze medicatiefiche?
Kopie vragen
- f. Welke van de volgende geneesmiddelgroepen worden –naast de gewone, dagelijkse orale medicatie– vermeld op de medicatiefiche?

| | |
|--|----------|
| i. Geneesmiddelen 1x per week te nemen | Ja / nee |
| ii. Oog- en oordruppels | Ja / nee |
| iii. Injecties (IV, SC, IM) | Ja / nee |
| iv. Dermatologische preparaten | Ja / nee |
| v. Rectale medicatie | Ja / nee |
- g. Hoe frequent wordt een nieuwe medicatiefiche aangemaakt?

| | |
|---------------------------------|------------------------|
| i. Bij elke wijziging | manueel / elektronisch |
| ii. Wekelijks | manueel / elektronisch |
| iii. Iedere weken | manueel / elektronisch |
| iv. Maandelijks | manueel / elektronisch |
| v. Minder dan eenmaal per maand | manueel / elektronisch |

- vi. Combinatie van 'bij elke wijziging' (manueel/elektronisch) en systematisch..... (ii, iii, iv of v) (manueel/elektronisch)
- vii. Niet van toepassing
- h. Is er iemand die regelmatig (minstens om de 6 maanden) nagaat of de medicatiefiche overeenstemt met het dossier en de voorschriften? (controle op juistheid en volledigheid) Ja / nee / weet het niet
 - i. Zo ja, met wat wordt de medicatiefiche vergeleken?
 - 1. Het verpleegkundig dossier
 - 2. Het medisch dossier
 - 3. Een ander dossier, nl. ...
 - ii. Wie voert de controle uit?
 - 1. Apotheker
 - 2. Arts
 - 3. Hoofdverpleegkundige
 - 4. Verpleegkundige
 - 5. Opvoeder
 - 6. Andere, nl.
- i. Is er altijd een voorschrift vooraleer chronische medicatie kan besteld worden bij de apotheker? Ja / nee / weet het niet
- j. Worden de afgeleverde geneesmiddelen telkens gecontroleerd op overeenstemming met het bestelformulier of de voorschriften?
 - i. Nee
 - ii. Ja
 - Indien ja,
 - 1. Met wat wordt vergeleken?
 - a. Met het bestelformulier
 - b. Met de voorschriften
 - c. Andere, nl. ...
 - 2. Wanneer?
 - a. Bij toelevering van de geneesmiddelen
 - b. Wanneer de geleverde geneesmiddelen voor de eerste maal uitgezet worden
 - c. Andere, nl.

6. Toeleverende apotheker

- a. Is er een centraal geneesmiddelendistributiepunt dat de bestelling en distributie van de geneesmiddelen in de instelling beheert?
 - i. Ja
 - ii. Nee
- b. Wie bestelt de medicatie bij het centraal distributiepunt / de toeleverende apotheker?
 - i. Instellingsarts
 - ii. Hoofdverpleegkundige

- iii. Verantwoordelijke van de afdeling
 - iv. Opvoeder
 - v. Administratief personeel
 - vi. Andere, nl. ...
- c. Hoe wordt de medicatie besteld bij het centraal distributiepunt / de toeleverende apotheker?
- i. Voorschriften worden vanuit de centraal geneesmiddelendistributiepunt gefaxt
 - ii. Voorschriften worden vanuit de centraal geneesmiddelendistributiepunt gemaild
 - iii. Voorschriften worden vanuit de leefgroepen gefaxt
 - iv. Voorschriften worden vanuit de leefgroepen gemaild
 - v. Instellingsartsen bezoeken apotheker
 - vi. Medewerkers van instelling bezorgen voorschrift aan apotheker
 - vii. Apotheker komt voorschriften ophalen in instelling
 - viii. Familie/voogd bestelt de medicatie bij eigen apotheker
 - ix. Telefonisch (voorschriften opgehaald bij afleveren)
 - x. Andere, nl.
- d. Hoe bereikt de medicatie de afdeling?
- i. Verantwoordelijke van het centraal geneesmiddelendistributiepunt levert
 - ii. Iemand van de apotheek levert af
 - 1. Zo ja, wie?
 - a. Apotheker zelf
 - b. Medewerker van de apotheek
 - a. Weet het niet
 - iii. Medewerkers van de instelling halen de geneesmiddelen af in de apotheek
 - iv. Ouders/familieleden van bewoners brengen de geneesmiddelen zelf
 - v. Andere, nl.
- e. Hoe worden de geneesmiddelen afgeleverd op de afdeling?
- i. Doosjes verpakt per bewoner, met de naam van de bewoner op elk doosje
 - ii. Doosjes verpakt per bewoner, maar zonder de naam van de bewoner op elk doosje
 - iii. Doosjes verpakt per afdeling, met de naam van de bewoner op elk doosje
 - iv. Doosjes verpakt per afdeling, zonder de naam van de bewoner
 - v. In eenheidsdosissen (= verpakt per eenheid zoals 1 pil/ampul/capsule), verpakt per bewoner
 - vi. In eenheidsdosissen, verpakt voor de afdeling
 - vii. In eenheidsdosissen, verpakt per toedienmoment
 - viii. In weekcassettes per bewoner
 - ix. In dagcassettes per bewoner
 - x. Andere, nl. ...
- f. Welke activiteiten vervult de verantwoordelijke van het centraal distributiepunt /de toeleverende apotheker voor de afdeling?
- i. Opstellen van een overzicht van geleverde geneesmiddelen per bewoner
Ja / nee / weet het niet

- ii. Verdeling geneesmiddelen in weekcassettes of dagcassettes
Ja / nee / weet het niet
- iii. Controle op vervallen geneesmiddelen Ja / nee / weet het niet
 - a. In centraal geneesmiddelendistributiepunt
 - b. Op afdeling
 - c. Andere, nl. ...
- iv. Verstrekken van geneesmiddeleninformatie en instructies voor adequate geneesmiddelentoediening aan de verpleegkundigen/opvoeders
Ja / nee / weet het niet
- v. Verstrekken van geneesmiddeleninformatie aan de artsen
Ja / nee / weet het niet / NVT (als verantw. geen apr. is)
- vi. Is betrokken bij/geeft advies omtrent het geneesmiddelenproces (buiten het voorschrijven)
Ja / nee / weet het niet
- vii. Evaluatie van het geneesmiddelengebruik per bewoner
Ja / nee / weet het niet
- viii. Optimalisatie van de farmacotherapie in overleg met de arts
Ja / nee / weet het niet
- ix. Controle van nieuwe voorschriften op geschiktheid van het geneesmiddel wat betreft aard, toedieningsvorm, sterkte, dosering en gebruiksduur
Ja / nee / weet het niet / NVT (als verantw. geen apr. is)
- x. Andere, nl.
- g. Wordt de verantwoordelijke van het centraal distributiepunt /de toeleverende apotheker geraadpleegd bij vragen en problemen omtrent geneesmiddelen op de afdeling?
 - i. Nee
 - ii. Ja
 - 1. Indien ja, op welke manier kan de toeleverende apotheker worden bereikt bij vragen en problemen?
 - a. Telefonisch, binnen de openingsuren van de apotheek
 - b. Telefonisch, ook buiten de openingsuren van de apotheek
 - c. Apotheker is keer per maand aanwezig in de instelling
 - d. Apotheker is aanwezig op vergaderingen met (bv. artsen – verpleegkundigen...)
 - e. Andere, nl. ...
- h. Indien géén centraal distributiepunt aanwezig is in de instelling:
 - i. Welk(e) type(s) apothe(e)k(en) leveren geneesmiddelen aan de instelling?
 - 1. Publieke apotheek (privé)
 - 2. Ziekenhuisapotheek
 - 3. Groothandel/keten van apotheken/gespecialiseerd bedrijf, nl.
 - 4. Ouders/familie brengen geneesmiddelen mee
 - 5. Andere, nl. ...
 - ii. Indien levering via publieke apotheek:
 - 1. Hoeveel apotheken leveren regelmatig geneesmiddelen?

2. Indien meer dan 1 toeleverende apotheek, via welk systeem wordt er gewerkt?
 - a. Apotheken wisselen elkaar af (beurtrol)
 - b. Apotheken leveren simultaan
 - c. Andere, nl. ...

7. Opslag van geneesmiddelen

- a. Worden er geneesmiddelen opgeslagen in de afdeling/leefgroep? Ja / nee
 - i. Zo ja, waar?
 1. Opgeslagen in apart lokaal uitsluitend voor bewaring van geneesmiddelen
 2. Opgeslagen in lokaal waar nog andere activiteiten worden uitgevoerd
 - a. Welke activiteiten worden er nog uitgevoerd?
 - b. Wat wordt er eventueel nog bewaard (naast medicatie)?
 3. Opgeslagen in geneesmiddelenkar
 4. Andere, nl. ...
 - ii. Gebeurt het opslaan van de medicatie op naam van de bewoners? Ja/nee
- b. Wordt de geneesmiddelenopslagplaats afgesloten (wanneer er geen activiteit plaatsvindt)?
 1. Nee
 2. Ja, altijd
 3. Ja, meestal
 4. Ja, enkel 's avonds
 5. Ja, gedeeltelijk (alleen sommige geneesmiddelen achter slot)
 - ii. Is er een aparte afsluitbare opslagplaats voor verdoovende middelen? Ja/nee/NVT (geen verdoovende middelen aanwezig)
 - iii. Is er een aparte koelkast aanwezig enkel voor de opslag van geneesmiddelen? Ja/nee
 - iv. Wordt de stockhoogte regelmatig gecontroleerd (minstens maandelijks)? Ja/nee
 - v. Wordt de vervaldatum regelmatig gecontroleerd (minstens om de 6 maanden)? Ja/nee
- c. Is er een reservevoorraad geneesmiddelen, niet op naam van individuele bewoners?
 - i. Ja, voor de volledige instelling
 - ii. Ja, op deze afdeling
 - iii. Nee (ga naar vraag d)
 1. Indien ja, welke geneesmiddelen zitten er in deze voorraad?

-
2. Is er een verantwoordelijke aangesteld voor deze voorraad geneesmiddelen?
 - a. Nee
 - b. Ja: (functie)
 - c. Weet het niet
 3. Hoe komt deze voorraad tot stand?
 - a. Via bestellingen bij de apotheek
 - b. Via overtollige medicatie van bewoners
 - c. Via stalen
 - d. Andere, nl. ...
 4. Wie heeft deze voorraad samengesteld?
 - a. Instellingsarts(en)
 - b. Apotheker
 - c. Afdelingsverantwoordelijke verpleegkundige
 - d. Andere, nl.
 - e. Weet het niet
 5. Is er een logboek waarin wordt genoteerd of er een geneesmiddel uit de reservevoorraad is gehaald, door welk personeelslid en voor welke bewoner?
 - a. Nee
 - b. Ja
 - d. Is er een afspraak met de verantwoordelijke van het centraal distributiepunt / apotheeker in verband met retourgeneesmiddelen (vb. teruggave van overbodige of vervallen geneesmiddelen) ? Ja/nee
 - i. Indien ja, hoe wordt dit precies geregeld?
 -
 -

8. Klaarzetten van geneesmiddelen

- a. Welk systeem wordt gebruikt voor het uitzetten van geneesmiddelen?

.....

.....

Potjes per bewoner, Cassette, Uni-doses, andere, nl.
- b. Aan de hand van welk document worden de geneesmiddelen klaargezet?
 - i. Met de medicatiefiche
 - ii. Met 1 lijst overgeschreven van de medicatiefiche
 - iii. Met meerdere lijsten overgeschreven van de medicatiefiche (vb. per toedieningstijdstip, siropen, druppels...)
 - iv. Andere, nl. ...
- c. Voor welke tijdsperiode worden de geneesmiddelen uitgezet?
 - i. Per week
 - ii. Per dag

- iii. Per toedieningstijdstip
 - iv. Andere, nl.
- d. Wie zet de geneesmiddelen klaar? (meerdere antwoorden mogelijk)
 - i. Verpleegkundigen
 - ii. Verzorg(st)ers
 - iii. Opvoeders
 - iv. Apotheker
 - v. Andere, nl.
- e. Wanneer worden geneesmiddelen klaargezet?
 - i. 's Nachts
 - ii. Overdag
 - iii. Niet van toepassing (indien per toedieningstijdstip)
- f. Wordt er geregistreerd wie de geneesmiddelen klaarzet? Ja / nee
- g. Wordt bij het afronden van het klaarzetten van de medicatie systematisch nog eens gecontroleerd (maw stemt dit overeen met de medicatiefiche of het voorschrift)?
 - i. Nee
 - ii. Ja, door dezelfde persoon
 - iii. Ja, door een collega
 - 1. Zo ja, wordt er geregistreerd wie de geneesmiddelen controleert?
Ja/nee
- h. Worden tabletten en capsules systematisch bij het klaarzetten uit de blister geduwd?
Ja/nee
- i. Welke geneesmiddelen worden net voor toediening klaargezet?
 - i. Oplossingen/suspensies/siropen Ja/nee
 - ii. Bruistabletten Ja/nee
 - iii. Poederzakjes Ja/nee
 - iv. Koel te bewaren geneesmiddelen Ja/nee
 - v. Via enterale sonde toe te dienen medicatie (vb. opgeloste tablet in spuit)
Ja/nee
- j. Worden net voor toediening klaargezette geneesmiddelen systematisch nog eens gecontroleerd?
 - i. Nee
 - ii. Ja, door dezelfde persoon
 - iii. Ja, door een collega

9. Toedienen van medicatie, registreren van toegediende medicatie

- a. Wie dient geneesmiddelen toe aan bewoners? (meerdere antwoorden mogelijk)
 - i. Verpleegkundige
 - ii. Verzorg(st)er
 - iii. Opvoeder
 - iv. Studenten verpleegkunde
 - v. Vrijwilliger
 - vi. Arts

- vii. Andere, nl. ...
- b. Is er een registratiesysteem bij het toedienen van geneesmiddelen? Ja/nee
 - i. Zo ja, wat wordt er geregistreerd?
 - 1. Toediening geslaagd
 - a. Per toedieningstijdstip per bewoner
 - b. Voor elk geneesmiddel per bewoner
 - 2. Toediening vergeten
 - 3. Toediening mislukt/geweigerd
 - 4. Foute toediening
 - 5. Andere, nl.
- c. Is er een standaardprocedure voor fouten of bijna-fouten in het geneesmiddelenproces? Ja/nee
 - i. Indien ja, wat houdt dit in? Er is ...
 - 1. Protocol over de te volgen procedure als iets zich voordoet
 - 2. Registratie
 - 3. Melding (aan wie?)
 - 4. Andere, nl. ...
 - ii. Doet men hier iets mee om in de toekomst fouten te vermijden?
 - 1. Nee
 - 2. Ja
 - 3. Weet het niet
 - a. Zo ja, wat?
 - a. Extra controle
 - b. Extra instructie
 - c. Andere, nl. ...
- d. Wordt de inname van een oraal geneesmiddel gecontroleerd?
 - i. Nee
 - ii. Ja, door controle achteraf of het geneesmiddel weg is
 - iii. Ja, door slikcontrole
- e. Wordt de medicatie soms geplet om toegediend te worden? Ja/nee
 - i. Zo ja, in welke gevallen?
- f. Welke bronnen worden geraadpleegd om na te gaan welke geneesmiddelen wel/niet mogen geplet worden?
 - i. Geen
 - ii. Instellingsarts
 - iii. Apotheker
 - iv. Bijsluiters
 - v. Databank www.pletmedicatie.be
 - vi. Handboeken, nl.
 - vii. Andere, nl.
- g. Wordt bij oraal toegediende, niet-pletbare medicatie gecontroleerd of er wordt gekauwd? Ja/nee
 - i. Indien op niet-pletbare medicatie wordt gekauwd, hoe wordt dit probleem opgelost?(bv. alternatieve

toedieningsweg)

10. Speciale toedieningswijzen van geneesmiddelen bij enterale nutritie

- a. Is er op de afdeling mogelijkheid tot voeding via enterale sonde?
 - i. Ja
 - ii. Nooit (ga naar punt 11)
- b. Hoeveel bewoners op de afdeling worden momenteel gevoed via een enterale sonde?
- c. Bestaat er in de instelling een schriftelijke procedure voor toediening van geneesmiddelen via sonde? Ja / nee / weet het niet
 - i. Indien ja, wat wordt hierin beschreven?
 1. Procedure monitoring sondevoeding
 2. Procedure voorbereiding medicatie voor toediening via sonde (vb. pletten tabletten, oplossen gelules, toxiciteit bereider bij antibiotica of chemo...)
 3. Procedure toedienen medicatie via sonde
 4. Procedure bij verstopping sonde
 5. Andere, nl.
- d. Wordt op de medicatiefiche vermeld:
 - i. Welke geneesmiddelen wel/niet mogen worden geplet Ja/nee
 - ii. Bij welke geneesmiddelen de sondevoeding een bepaalde tijd voor en na toediening moet worden gestopt Ja/nee
 - iii. Hoeveel milliliter water werd toegevoegd bij flushen Ja/nee
- e. Welke bronnen worden gebruikt bij informatie voor toediening van geneesmiddelen via sonde?
 - i. De schriftelijke procedure
 - ii. Handboek enteralia
 - iii. Handbook of drug administration via enteral feeding tubes
 - iv. BCFI
 - v. Bijsluiters
 - vi. Compendium
 - vii. Databank www.pletmedicatie.be
 - viii. Behandelende arts
 - ix. Instellingsarts
 - x. Apotheker
 - xi. Andere, nl.
- f. Worden er veiligheidsmaatregelen genomen om enterale misconnectie te vermijden? (enterale voeding per ongeluk IV geven) Ja / nee / NVT / weet het niet
 - i. Indien ja, welke?
 1. Label met vermelding “uitsluitend enteraal gebruik” op enterale nutritie-zak

2. Spuiten met speciale tip waardoor connectie met IV lijnen onmogelijk wordt
 3. Oral Liquid Dispenser (speciale paarse spuit voor enterale voeding)
 4. Andere, nl.
- g. Overlegt de arts met anderen omtrent het voorschrijven van geneesmiddelen die via sonde moeten worden toegediend?
- i. Ja
 - ii. Nee
 - iii. Weet het niet
 1. Indien ja, met wie?
 - a. Apotheker
 - b. Hoofdverpleegkundige
 - c. Verpleegkundige
 - d. Medische dienst
 - e. Andere, nl.
- h. Wordt aan de toeleverende apotheker gemeld welke geneesmiddelen via sonde moeten worden toegediend? Ja/nee

11. Overige

- a. Wordt er systematisch een medicatiefiche meegegeven bij opname van een bewoner in een ziekenhuis? Ja/nee
- b. Is er een standaardprocedure in verband met medicatie wanneer een bewoner het ziekenhuis terug verlaat? Ja/nee
 - i. Zo ja, wat?
- c. Wordt systematisch een overzicht van de medicatie meegegeven bij overdracht naar dagbesteding of thuissituatie? Ja/nee
- d. Welke informatie is er ter beschikking op de afdeling/leefgroep?
 - i. Kwaliteitshandboek
 - ii. Gecommentarieerd geneesmiddelenrepertorium: gedrukt (jaar.....) – internet
 - iii. Compendium wetenschappelijke bijsluiters: gedrukt (jaar.....) – internet
 - iv. Handboek enteralia
 - v. Handbook of drug administration via enteral feeding tubes
 - vi. Databank www.pletmedicatie.be
 - vii. Patiëntenbijsluiters
 - viii. Andere, nl.
- e. Welke informatiebronnen worden in de praktijk ook effectief gebruikt?
 - i. Kwaliteitshandboek
 - ii. Gecommentarieerd geneesmiddelenrepertorium: gedrukt (jaar.....) – internet
 - iii. Compendium wetenschappelijke bijsluiters: gedrukt (jaar.....) – internet
 - iv. Handboek enteralia
 - v. Handbook of drug administration via enteral feeding tubes
 - vi. Databank www.pletmedicatie.be

- vii. Patiëntenbijsluiters
- viii. Andere, nl.
- f. Wordt er geneesmiddeleninformatie gevraagd aan de toeleverende apothekers?
Ja/nee
 - i. Zo ja, welke informatie wordt gevraagd?
 - 1. Wijze van toedienen geneesmiddel
 - 2. Bewaring geneesmiddel
 - 3. Mogelijke interacties tussen geneesmiddelen
 - 4. Pletbaarheid van geneesmiddelen
 - 5. Andere, nl.
- g. Wordt er geneesmiddeleninformatie gevraagd aan de instellingsarts? Ja/nee
 - i. Zo ja, welke informatie wordt gevraagd?
- h. Wordt er bij de start van een nieuw geneesmiddel informatie gegeven voor de gebruiker? Ja/nee
 - i. Indien ja, aan wie?
 - 1. Ouders of familieleden van de bewoners
 - 2. Relatief zelfstandige personen met een beperking
 - 3. Andere, nl.
 - ii. Indien ja, waarover?
 - 1. Over de indicatie van het geneesmiddel
 - a. Nee, nooit
 - b. Alleen op vraag van de bewoner/ouders
 - c. Ja, voor sommige geneesmiddelen
 - d. Ja, systematisch
 - e. Ja, maar alleen als er zich problemen voordoen
 - 2. Over de inname van het geneesmiddel
 - a. Nee, nooit
 - b. Alleen op vraag van de bewoner/ouders
 - c. Ja, voor sommige geneesmiddelen
 - d. Ja, systematisch
 - e. Ja, maar alleen als er zich problemen voordoen
 - 3. Over de nevenwerkingen van het geneesmiddel
 - a. Nee, nooit
 - b. Alleen op vraag van de bewoner/ouders
 - c. Ja, voor sommige geneesmiddelen
 - d. Ja, systematisch
 - e. Ja, maar alleen als er zich problemen voordoen
- i. Wordt het geneesmiddelenproces geëvalueerd met het oog op verbeteracties?
 - i. Nee
 - ii. Ja, minstens om de 6 maanden, namelijk iedere maanden
 - iii. Ja, jaarlijks
 - iv. Ja, om de jaar

1. Zo ja, wat houdt deze evaluatie precies

in?

.....

.....

- j. Welke zijn volgens u de meest frequent voorkomende problemen op vlak van het geneesmiddelenbeleid en -gebruik in de instelling?

.....
Vervallen geneesmiddelen worden gebruikt - Bewaring geneesmiddelen niet optimaal - Toedieningsfouten geneesmiddel (verkeerde tijdstip/verkeerde dosis/ verkeerde geneesmiddel/ verkeerde toedieningsweg...) - Gebrekkige communicatie tussen instellingsartsen en andere behandelende artsen - gebrekkig contact met toeleverende apotheker

- k. Welke aanpassingen in het geneesmiddelenbeleid zouden kunnen leiden tot een verhoogde kwaliteit in de zorgverlening?

.....

Opleiding verpleegkundigen/opvoeders omtrent toedienen van geneesmiddelen - Aanbod wetenschappelijke literatuur uitbreiden in de instelling - Opstellen richtlijnen omtrent medicatietoediening - Opstellen formularium - Stimulatie (anoniem) rapporteren van geneesmiddelfouten - Maandelijks medicatie review door apotheker - Periodieke evaluatie van de medicatiefiches door de arts - Apotheker toegang verlenen tot het medisch dossier van de bewoners (o.a. klinische laboratoriumwaarden), mits toestemming van de bewoner of ouders/voogd

Tijdstip einde interview

Opmerkingen te noteren door de enquêteur op vraag van de geïnterviewde:

| |
|--|
| Vragenlijst verantwoordelijke centraal geneesmiddelendistributiepunt |
|--|

Functie van de bevrage:

Datum van de bevraging:

Tijdstip aanvang interview:

1. Algemeen

a. Wie is de verantwoordelijke van het centraal geneesmiddelendistributiepunt?

- i. Instellingsarts
- ii. Apotheker
- iii. Verpleegkundige
- iv. Opvoed(st)er
- v. Andere, nl. ...

2. Toeleverende apotheker

a. Wie bestelt de medicatie bij de toeleverende apotheker?

- i. Instellingsarts
- ii. Hoofdverpleegkundige
- iii. Opvoeder
- iv. Administratief personeel
- v. Verantwoordelijke centraal geneesmiddelendistributiepunt
- vi. Medewerkers centraal geneesmiddelendistributiepunt
- vii. Andere, nl. ...

b. Welk(e) type(s) apothe(e)k(en) leveren geneesmiddelen aan de instelling?

- i. Publieke apotheek (privé)
- ii. Ziekenhuisapotheek
- iii. Groothandel/keten van apotheken/gespecialiseerd bedrijf, nl.
- iv. Ouders/familie brengen geneesmiddelen mee
- v. Andere, nl. ...

c. Indien levering via publieke apotheek:

- i. Hoeveel apotheken leveren regelmatig geneesmiddelen?
- ii. Indien meer dan 1 toeleverende apotheek, via welk systeem wordt er gewerkt?
 - 1. Apotheken wisselen elkaar af (beurtrol)
 - 2. Apotheken leveren simultaan
 - 3. Andere, nl. ...

d. Op welke wijze wordt de medicatie besteld in de toeleverende apotheek?

- i. Voorschriften worden vanuit het centraal geneesmiddelendistributiepunt gefaxt
- ii. Voorschriften worden vanuit het centraal geneesmiddelendistributiepunt gemaild
- iii. Voorschriften worden vanuit de leefgroep gefaxt
- iv. Voorschriften worden vanuit de leefgroep gemaild

- v. Instellingsartsen bezoeken apotheker
 - vi. Medewerkers van instelling bezorgen voorschrift aan apotheker
 - vii. Apotheker komt voorschriften ophalen in instelling
 - viii. Familie/voogd bestelt de medicatie bij eigen apotheker
 - ix. Telefonisch (voorschriften opgehaald bij afleveren)
 - x. Andere, nl.
- e. Hoe bereikt de medicatie de instelling?
- i. Iemand van de apotheek levert af
 - 1. Zo ja, wie?
 - a. Apotheker zelf
 - b. Medewerker van de apotheek
 - c. Weet het niet
 - ii. Medewerkers van de instelling halen de geneesmiddelen af in de apotheek.
 - iii. Ouders/familieleden van bewoners brengen de geneesmiddelen zelf
 - iv. Andere, nl.
- f. Hoe worden de geneesmiddelen afgeleverd in de instelling?
- i. Doosjes verpakt per bewoner, met de naam van de bewoner op elk doosje
 - ii. Doosjes verpakt per bewoner, maar zonder de naam van de bewoner op elk doosje
 - iii. Doosjes verpakt per afdeling , met de naam van de bewoner op elk doosje
 - iv. Doosjes verpakt per afdeling, zonder de naam van de bewoner
 - v. In eenheidsdosissen (= verpakt per eenheid zoals 1 pil/ampul/capsule), verpakt per bewoner
 - vi. In eenheidsdosissen, verpakt voor de afdeling
 - vii. In eenheidsdosissen, verpakt per toedienmoment
 - viii. In weekcassettes per bewoner
 - ix. In dagcassettes per bewoner
 - x. Andere, nl. ...
- g. Welke activiteiten vervult de toeleverende apotheker voor de instelling?
- i. Opstellen van een overzicht van toegeleverde geneesmiddelen per bewoner
 - ii. Verdeling geneesmiddelen in weekcassettes of dagcassettes
 - iii. Controle op vervallen geneesmiddelen
 - a. In een centraal geneesmiddelendistributiepunt
 - b. Op afdeling
 - c. Andere, nl. ...
 - iv. Verstrekken van geneesmiddeleninformatie en instructies voor adequate geneesmiddelentoediening aan de verpleegkundigen
 - v. Verstrekken van geneesmiddeleninformatie aan de artsen
 - vi. Is betrokken bij/geeft advies omtrent het geneesmiddelenproces in de instelling (buiten het voorschrijven)
 - vii. Evaluatie van het geneesmiddelengebruik per bewoner
 - viii. Optimalisatie van de farmacotherapie in overleg met de arts

- ix. Controle van nieuwe voorschriften op geschiktheid van het geneesmiddel wat betreft aard, toedieningsvorm, sterkte, dosering en gebruiksduur
- x. Andere, nl.
- h. Wordt de toeleverende apotheker geraadpleegd bij vragen en problemen omtrent geneesmiddelen in de instelling?
 - i. Nee
 - ii. Ja
 - 1. Indien ja, op welke manier kan de apotheker worden bereikt bij vragen en problemen?
 - a. Telefonisch, binnen de openingsuren van de apotheek
 - b. Telefonisch, ook buiten de openingsuren van de apotheek
 - c. Toeleverende apotheker is keer per maand aanwezig in de instelling
 - d. Toeleverende apotheker is aanwezig op vergaderingen met(bv. artsen – verpleegkundigen....)
 - e. Andere, nl. ...
- i. Hoe verloopt de geneesmiddelendistributie vanuit het centraal geneesmiddelen-distributiepunt naar de verschillende afdelingen/leefgroepen?

3. Opslag van geneesmiddelen

- a. Wordt de geneesmiddelenopslagplaats afgesloten (wanneer er geen activiteit plaatsvindt)?
 - 1. Nee
 - 2. Ja, altijd
 - 3. Ja, meestal
 - 4. Ja, enkel 's avonds
 - 5. Ja, gedeeltelijk (alleen sommige geneesmiddelen achter slot)
- ii. Is er een aparte afsluitbare opslagplaats voor verdovende middelen? Ja/nee
- iii. Is er een aparte koelkast aanwezig enkel voor de opslag van geneesmiddelen? Ja/nee
- iv. Wordt de stockhoogte van de geneesmiddelenvoorraad regelmatig gecontroleerd (minstens maandelijks)? Ja/nee
- v. Wordt de vervaldatum van de voorraad regelmatig gecontroleerd (minstens om de 6 maanden)? Ja/nee
- b. Is er een reservevoorraad geneesmiddelen, niet op naam van individuele bewoners?
 - i. Ja, voor de volledige instelling
 - ii. Ja, op deze afdeling
 - iii. Nee (ga naar vraag d)

- #### 4. Overige

- Vervallen geneesmiddelen worden gebruikt - Bewaring geneesmiddelen niet optimaal - Toedieningsfouten geneesmiddel (verkeerde tijdstip/verkeerde dosis/ verkeerde geneesmiddel/ verkeerde toedieningsweg...) - Gebrekkige communicatie tussen instellingsartsen en andere behandelende artsen - gebrekkig contact met toeleverende apotheker*

.....
.....
Opleiding verpleegkundigen/opvoeders omtrent toedienen van geneesmiddelen - Aanbod wetenschappelijke literatuur uitbreiden in de instelling - Opstellen richtlijnen omtrent medicatietoediening - Opstellen formularium - Stimulatie (anoniem) rapporteren van geneesmiddelfouten - Maandelijkse medicatie review door apotheker - Periodieke evaluatie van de medicatiefiches door de arts - Apotheker toegang verlenen tot het medisch dossier van de bewoners (o.a. klinische laboratoriumwaarden), mits toestemming van de bewoner of ouders/voogd

Tijdstip einde interview

Opmerkingen te noteren door de enquêteur op vraag van de geïnterviewde:

| |
|---|
| Vragenlijst instellingsarts of verantwoordelijke van de medische dienst |
|---|

Functie van de bevroagde:

Datum bevraging:

Tijdstip aanvang interview:

Aantal bewoners in instelling die geneesmiddel via sonde krijgen toegediend:

1. Hoe vaak is er een instellingsarts in de instelling aanwezig?
 - a.u/week
 - b.halve dagen/week
 - c. Geen instellingsarts aanwezig
 - d. Andere, nl. ...
2. Worden de bewoners nog door andere artsen dan de instellingsartsen behandeld?

Ja/nee

 - a. Zoja, bestaan er afspraken tussen de instellingsartsen en deze artsen? Ja/nee
Welke?
.....
.....
Vb. gebruik van formularium adviseren – aanpassing behandeling melden aan de instellingsarts...
3. Welke taken neemt u voor uw rekening in de instelling?
 - a. Inzetten, wijzigen en beëindigen van medicatieopdrachten
 - b. Beschikbaar stellen van adequate wetenschappelijke informatie in de instelling
 - c. Informatie aan verpleegkundigen/opvoeders omtrent toedieningswijze van geneesmiddelen
 - d. Regelmatige evaluatie van de voorgeschreven geneesmiddelen bij bewoners in overleg met verpleegkundigen
 - i. Zo ja, hoe vaak? (vb. x aantal keer per jaar)
 - e. Regelmatige evaluatie van de voorgeschreven geneesmiddelen bij bewoners in overleg met apotheker
 - i. Zo ja, hoe vaak? (vb. x aantal keer per jaar)
 - f. Verantwoordelijke centraal geneesmiddelendistributiepunt
 - g. Toezicht op de kwaliteit van het geneesmiddelenbeleid
 - h. Transfer van informatie van en naar ziekenhuis
 - i. Andere, nl. ...
4. Op welke manier worden geneesmiddelen voorgeschreven in de instelling?
 - a. Manueel
 - i. Herhaalvoorschriften

☐ geschreven door verpleegkundige/opvoeder en gehandtekend door arts

☐ door arts geschreven en gehandtekend
 - ii. Nieuwe voorschriften

☐ door verpleegkundige/opvoeder geschreven en door arts gehandtekend

- O door arts geschreven en gehandtekend
 - iii. Andere, nl. ...
 - b. Elektronisch
 - i. Herhaalvoorschriften
 - O automatisch naar apotheek gestuurd
 - O door verpleegkundige/opvoeder in de computer ingevoerd en bevestigd door arts
 - O door arts persoonlijk in de computer ingevoerd en bevestigd
 - ii. Nieuwe voorschriften
 - O door verpleegkundige/opvoeder in de computer ingevoerd en bevestigd door arts
 - O door arts persoonlijk in de computer ingevoerd en bevestigd
 - iii. Andere, nl. ...
- 5. Is er een formularium aanwezig in de instelling? Ja/nee
- 6. Wordt het formularium ook effectief gebruikt bij het voorschrijven?
 - a. Nooit
 - b. Sporadisch
 - c. Systematisch
 - d. Geen formularium aanwezig
 - e. Weet het niet
- 7. Wordt een nieuwe behandelende arts bij een eerste bezoek op de hoogte gesteld van een formularium?
 - a. Nooit
 - b. Sporadisch
 - c. Systematisch
 - d. Geen formularium aanwezig
 - e. Weet het niet
- 8. Kan de behandelende arts buiten het formularium voorschrijven zonder dit te motiveren?
 - a. Ja
 - b. Nee
 - c. Niet van toepassing
- 9. Indien elektronisch wordt voorgeschreven, komen de formulariumgeneesmiddelen als eerste keuze tevoorschijn?
 - a. Ja
 - b. Nee
 - c. Niet van toepassing
- 10. Hoe verloopt de procedure voor het opstarten/wijzigen/stoppen van medicatie?
 - a. De arts communiceert dit en bezorgt het nieuwe voorschrift aan de verantwoordelijke verpleegkundige van de afdeling
 - b. De arts laat een nota achter in het dossier van de bewoner
 - c. Andere, nl.
- 11. Wanneer er een nieuw geneesmiddel wordt voorgeschreven, waar komen deze gegevens terecht?
 - a. In het verpleegkundig dossier

- b. In het medisch dossier
 - c. Andere, nl.
- 12. Wordt er systematisch een medicatiefiche meegegeven bij opname van een bewoner in een ziekenhuis? Ja/nee
- 13. Is er een standaardprocedure in verband met medicatie wanneer een bewoner het ziekenhuis terug verlaat? Ja/nee
 - a. Zo ja, wat?
- 14. Wordt systematisch een overzicht van de medicatie meegegeven bij overdracht naar dagbesteding of thuissituatie? Ja/nee
- 15. Wordt de medicatiefiche periodiek geëvalueerd? (Hiermee wordt een grondige herziening van de medicatie bedoeld, om na te gaan of de geneesmiddelen nog steeds geïndiceerd zijn, de dosis en de vorm eventueel dient aangepast te worden, en of er geneesmiddelen moeten toegevoegd worden)
 - a. Nee
 - b. Ja, sporadisch (vb. wanneer er problemen zijn)
 - c. Ja, systematisch (minstens om de 6 maanden), namelijk iedere maanden
 - i. Indien ja, wie is betrokken bij deze evaluatie? (meerdere antwoorden mogelijk)
 - 1. Apotheker
 - 2. Hoofdverpleegkundige
 - 3. Verpleegkundige
 - 4. Instellingsarts
 - 5. Opvoeder
 - 6. Andere, nl.
- 16. Gebeurt er overleg tussen de artsen en de toeleverende apotheker(s)? Ja/nee
 - a. Indien ja, waarover?
 - i. Evaluatie van de medicatiefiche per bewoner
 - ii. Evaluatie van de farmacotherapie
 - iii. Evaluatie van het geneesmiddelendistributiesysteem
 - iv. Andere, nl. ...
- 17. Welke zijn volgens u de meest frequent voorkomende problemen op vlak van het geneesmiddelenbeleid en -gebruik in de instelling?

Vervallen geneesmiddelen worden gebruikt - Bewaring geneesmiddelen niet optimaal - Toedieningsfouten geneesmiddel (verkeerde tijdstip/verkeerde dosis/ verkeerde geneesmiddel/ verkeerde toedieningsweg...) - Gebrekkige communicatie tussen instellingsartsen en andere behandelende artsen - gebrekkig contact met toeleverende apotheker.
- 18. Heeft u reeds te maken gehad met ernstige fouten i.v.m. het gebruik van geneesmiddelen? Ja / nee
 - a. Zo ja,
 - i. Wat was de oorzaak?
 - ii. Wat waren de gevolgen?
 - iii. Hoe had dit kunnen vermeden worden?

19. Is er een standaardprocedure voor fouten of bijna-fouten in het geneesmiddelenproces? Ja/nee
- a. Indien ja, wat houdt dit in? Er is ...
 - i. Protocol over de te volgen procedure als iets zich voordoet
 - ii. Registratie
 - iii. Melding (aan wie?)
 - iv. Andere, nl. ...
 - b. Doet men hier iets mee om in de toekomst fouten te vermijden? Ja/nee
 - i. Zo ja, wat?
 1. Extra controle
 2. Extra instructie
 3. Andere, nl. ...
20. Wordt het geneesmiddelenproces geëvalueerd met het oog op verbeteracties?
- i. Nee
 - ii. Ja, minstens om de 6 maanden, namelijk iedere maanden
 - iii. Ja, jaarlijks
 - iv. Ja, om de jaar
 1. Zo ja, wat houdt deze evaluatie precies in?

21. Welke aanpassingen in het geneesmiddelenbeleid zouden kunnen leiden tot een verhoogde kwaliteit in de zorgverlening?

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Opleiding verpleegkundigen/opvoeders omtrent toedienen van geneesmiddelen - Aanbod wetenschappelijke literatuur uitbreiden in de instelling - Opstellen richtlijnen omtrent medicatietoediening - Opstellen formularium - Stimulatie (anoniem) rapporteren van geneesmiddelfouten - Maandelijkse medicatie review door apotheker - Periodieke evaluatie van de medicatiefiches door de arts - Apotheker toegang verlenen tot het medisch dossier van de bewoners (o.a. klinische laboratoriumwaarden), mits toestemming van de bewoner of ouders/voogd

Tijdstip einde interview

Opmerkingen te noteren door de enquêteur op vraag van de geïnterviewde:

APPENDIX 2: FOCUS GROUP VIGNETTES

INTRODUCTIE BIJ DE CASUSSEN

Tim is aan het werk in de instelling Morgendauw. Hij maakt er een werk (voor school) over hoe de medicatie wordt toegediend.

Tim heeft gekeken hoe de begeleiders medicatie toedienen via sonde. Daarnaast heeft hij ook bekeken wat wetenschappers zeggen over de toediening van medicatie via sonde. De verschillen heeft hij besproken met de afdelingsarts.

Hij heeft nu een aantal voorstellen voor verbetering die hij met het team wil bespreken om te weten of dit haalbaar is of niet.

OBSERVATIE 1

Bewoner Nick is 16 jaar en heeft een maagsonde. Via deze sonde krijgt hij continu sondevoeding en worden zijn geneesmiddelen toegediend.

Personeelslid Patricia **bereidt** Nick zijn geneesmiddelen **voor** (3 tabletten tegen epilepsie, tegen spasticiteit, en tegen maagproblemen), zoals ze het op de afdeling meestal doen:

- Ze neemt de 3 tabletten, en plet die allemaal samen in een mortier mbv een stamper
- Ze doet het poeder uit de mortier in een beker
- Ze voegt water bij het poeder in de beker
- Ze roert met de spuit in de beker, en zuigt dan de inhoud op

Patricia neemt ook nog een andere spuit, en zuigt hierin 10mL water op.

Toedienen via sonde:

- Patricia neemt de spuit met geneesmiddelen, koppelt de spuit aan het verbindingstukje van de maagsonde en draait het kraantje in de goede richting.
- Vervolgens duwt ze de spuit leeg, sluit ze het kraantje en koppelt de spuit af.
- Daarna neemt ze de spuit met water, koppelt de spuit aan het verbindingstukje van de maagsonde, draait het kraantje in de goede richting, en duwt ook deze leeg. Tenslotte sluit ze het kraantje en koppelt de spuit af.

Student Tim en de afdelingsarts stellen volgende nieuwe werkwijzen voor om interacties tussen de geneesmiddelen en verstopping van de sonde te vermijden:

- 1) De tabletten elk apart te pletten (i.p.v. alle 3 samen), en ze ook elk apart toe te dienen.

- 2) De sonde te spoelen met water: voor de toediening van geneesmiddelen, tussen elk toegediend geneesmiddel, en na de toediening van de geneesmiddelen.
- 3) De sondevoeding te stoppen tijdens de medicatietoediening.

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| OBSERVATIE 2 |
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Zoë is 10 jaar en heeft een maagsonde. Ze krijgt 3x per dag Motilium® siroop toegediend.

Personeelslid Filip neemt de fles Motilium® siroop. Hij neemt een spuit, trekt hiermee 5mL Motilium® siroop rechtstreeks uit de fles op, en dient dit toe.

Student Tim en de afdelingsarts stellen volgende nieuwe werkwijzen voor:

- 1) Motilium® siroop / alle vloeibare medicatie altijd eerst te schudden voor gebruik
(om altijd gelijke dosis geneesmiddel te hebben)
- 2) Vloeibare medicatie te verdunnen met minstens een gelijke hoeveelheid water: nadat de vloeibare medicatie is opgetrokken in een spuit, water uit een bekertje hierbij optrekken
(om gemakkelijk door de sonde te vloeien)

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| OBSERVATIE 3 |
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Bewoner Jeremy is 14 jaar en heeft een maagsonde.

Personeelslid Veronique begint aan de voorbereiding van Jeremy zijn geneesmiddelen. Ze neemt de gelule (Luminal®), haalt de stamper uit de spuit, doet de gelule in zijn geheel in de spuit, plaatst de stamper terug in de spuit, en zuigt water op. Daarna schudt ze met de gevulde spuit. Vijf minuten later dient ze dit geneesmiddel toe via sonde.

Student Tim en de afdelingsarts stellen voor om vanaf nu de gelules te openen bij voorbereiding:
(om te vermijden dat het gelule-omhulsel de sonde verstopt)

- 1) Gelule openen
- 2) De inhoud van de gelule in een potje doen
- 3) Water in het potje doen
- 4) Roeren in het potje
- 5) Het geheel opzuigen in een spuit en inspuiten in de sonde

- 6) Daarna het potje naspoelen met een beetje water, en dit spoelwater ook inspuiten in de sonde

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| OBSERVATIE 4 |
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Bewoner Marijke is 8 jaar en heeft een maagsonde.

Voor haar schildklierproblemen krijgt ze dagelijks L-Thyroxine® (Euthyrox®).

Om de tablet L-Thyroxine® te kunnen toedienen via sonde, plet personeelslid Jan deze tablet met een plettoestel. Hij draagt hierbij geen handschoenen en geen mondmasker.

Student Tim en de afdelingsarts stellen voor om vanaf nu wel handschoenen en een mondmasker te dragen als hormonen (bv. L-Thyroxine®) of antibiotica tabletten moeten worden geplet.

APPENDIX 3: ADVICES TOWARDS DIRECTION, MEDICAL OFFICE STAFF, AND DELIVERING PHARMACIST

MOGELIJKE AANDACHTSPUNTEN EN ADVIEZEN VOOR DIRECTIE/INSTELLING I.V.M. MEDICATIETOEDIENING IN INSTELLINGEN VOOR PERSONEN MET MENTALE BEPERKING

Onderstaande mogelijke aandachtspunten en adviezen i.v.m. medicatietoediening in instellingen voor personen met mentale beperking zijn opgesteld op basis van observationeel onderzoek en op basis van aanbevelingen uit de literatuur. Het betreft algemene adviezen; deze zijn dus niet specifiek aangepast aan de werking van uw instelling. Wij bieden u deze vrijblijvend aan, zodat u kan bekijken wat er haalbaar en nuttig is voor uw concrete situatie.

- ❖ Evalueer de nood aan de oprichting van een medicatiecommissie
- ❖ Stel een protocol/werkinstructie op die medicatievoorbereiding en –toediening (via sonde) beschrijft (of laat dit opstellen door de medicatiecommissie)
- ❖ Maak de inhoud van de protocollen omtrent medicatie bekend aan alle belanghebbende personeelsleden (want deze zijn nu vaak niet gekend, of ze weten niet waar dit op te zoeken)
- ❖ Voorzie in opleiding en toetsing van deskundigheid van personeelsleden m.b.t. medicatie & leg afspraken omtrent opleiding vast:
 - Enkel personeelsleden die de opleiding omtrent medicatietoediening (via sonde) hebben gekregen, mogen medicatie (via sonde) toedienen:
 - Bv. basiskennis aanleren via e-learningcursussen van het Nederlandse Instituut voor Verantwoord Medicatiegebruik (specifiek voor begeleiders in de gehandicaptenzorg, over medicatie in het algemeen):
 - ✓ 'Duidelijkheid over Medicijngebruik deel 1 - Basiskennis': belangrijkste begrippen en aandachtspunten op het gebied van medicatie en medicatieveiligheid leren (via www.medicijngebruik.nl → Zoek in ons aanbod → selecteer 'begeleider' bij 'Doelgroep' & 'e-learning/nascholing' bij 'Type product' → Toon resultaten)
 - ✓ 'Duidelijkheid over Medicijngebruik deel 2 - Medicijn groepen': kennis maken met belangrijkste medicijnen en medicijn groepen en leren hoe deze medicijnen goed en veilig gebruikt worden (via www.medicijngebruik.nl → Zoek in ons aanbod → selecteer 'begeleider' bij 'Doelgroep' & 'e-learning/nascholing' bij 'Type product' → Toon resultaten)
 - Leg in een protocol vast wie welke opleiding moet volgen, frequentie,...

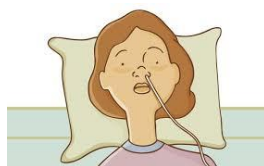
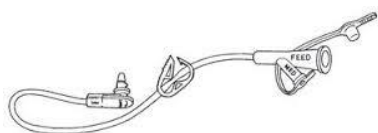
- ❖ Herbekijk de taakverdeling van de personeelsleden die medicatie moeten voorbereiden en toedienen (via sonde) → zien hoe men efficiënter kan werken en hoe men tijd kan vrijmaken om de nodige aandacht te besteden aan medicatievoorbereiding en –toediening en om te kunnen werken volgens de huidige aanbevelingen
 - Bv. 1 personeelslid per toedienmoment (bv. middag) is verantwoordelijk voor zowel voorbereiding als toediening van de medicatie, zodat de eventuele andere personeelsleden zich met de niet-medicatie gerelateerde zaken kunnen bezighouden (eten geven, wassen,...) en de “stoorzenders” (bv. telefoon) kunnen opvangen
 - ⇒ Evt. gebruik van “niet-storen-hesje” of iets dergelijks, zodat het voor iedereen duidelijk is dat die persoon bezig is met medicatie en dus niet mag worden gestoord (wat de medicatieveiligheid ten goede komt en de medicatietoediening efficiënter maakt)
- ❖ Laat de medische dienst voldoende materiaal –nodig voor medicatietoediening via sonde– voorzien voor de uitvoerende personeelsleden (handschoenen, mondmaskers, spuiten,...)
 - Voorzie ruimte voor de voorbereiding van medicatie en houd daarbij rekening met veiligheid
 - Maak het mogelijk om de ruimte af te sluiten door bv. te werken in een afzonderlijke kamer, kinderhekje om deel van de ruimte af te sluiten, ...
 - Niet in nabijheid van eten
- ❖ Implementeer een foutenrapporteringssysteem:
 - Systeem dat personeelsleden aanzet om vrijwillig fouten te rapporteren (no blame beleid bij melden van fouten)
 - Procedure foutenrapportering beschrijven in protocol
 - Opvolging voorzien van deze rapportering → afhankelijk van de gerapporteerde fouten, voorzien van opleidingsinitiatieven, organisatorische wijzigingen, ...
- ❖ Geef de medische dienst de opdracht om at random de voorbereiding en toediening van medicatie (via sonde) te gaan observeren, waarna de eventuele problemen kunnen aangepakt worden in overleg
- ❖ Evalueer (de verschillende aspecten van) het volledige medicatieproces minstens 1x/jaar → identificeren van punten in dit proces die moeten verbeteren & voorstellen van actiepunten
 - via interne audits
 - in protocol vastleggen wie wat uitvoert, frequentie,...


- ❖ Sluit overeenkomsten met de toeleverende apotheker omtrent:
 - Zijn rol in de instelling:
 - in het volledige medicatieproces (bv. 1x/jaar aanwezig bij vergadering omtrent dit proces)
 - m.b.t. het mee ontwikkelen van de procedures en protocollen over medicatie
 - in het bekijken van de therapie van de patiënt
 - i.v.m. opleiding over medicatie
 - Communicatie tussen voorziening en toeleverende apotheker, bv.
 - hoe en wie contacteren bij dringende zaken
 - medicatiespreekuur met de apr. vastleggen
 - gebruik van een communicatieschriftje (om medicatie gerelateerde zaken in mee te delen, uit te leggen,...)
- ❖ Leg taken, verantwoordelijkheden en bevoegdheden, procedures en werkinstructies m.b.t. medicatie vast in het kwaliteitshandboek
- ❖ Nuttige bronnen:
 - Zorg zelf voor Betere Medicatieveiligheid (Vilans) → handvatten voor het opzetten van een verbetertraject en het meten van medicatieveiligheid binnen de eigen organisatie
(pdf-document te downloaden via <http://www.kennispleingehandcaptensector.nl/gehandcaptenzorg/Product-Toolkit-Zorg-zelf-voor-Betere-Medicatieveiligheid.html>)
 - Slik geen medicatiefouten (Vilans) → tips om medicatiefouten te voorkomen
(pdf-document te downloaden via google of via <http://www.invoorzorg.nl/ivz/literatuur-slik-geen-medicatiefouten.html>)
 - Handreiking Medicatiebeleid Gehandcaptenzorg (Vereniging Gehandcaptenzorg Nederland) → om het proces van voorschrijven en verstrekken van medicatie te structureren en bewaken
(pdf-document te downloaden via <http://www.kennispleingehandcaptensector.nl/gehandcaptenzorg/Product-Handreiking-Medicatiebeleid-Gehandcaptenzorg.html>)
 - Geneesmiddelinformatie in zorginstellingen (GIP-z) (Healthbase) → met GIP-z biedt u patiënten in het ziekenhuis, GGZ of verpleeghuis begrijpelijke informatie over hun geneesmiddelen
(meer informatie zie <http://www.healthbase.nl/bestellen/gip-z/>)

MOGELIJKE AANDACHTSPUNTEN EN ADVIEZEN VOOR MEDISCHE DIENST I.V.M. MEDICATIETOEDIENING IN INSTELLINGEN VOOR PERSONEN MET MENTALE BEPERKING

Onderstaande mogelijke aandachtspunten en adviezen i.v.m. medicatietoediening in instellingen voor personen met mentale beperking zijn opgesteld op basis van observationeel onderzoek en op basis van aanbevelingen uit de literatuur. Het betreft algemene adviezen; deze zijn dus niet specifiek aangepast aan de werking van uw instelling. Wij bieden u deze vrijblijvend aan, zodat u kan bekijken wat er haalbaar en nuttig is voor uw concrete situatie.

- ❖ Evalueer de nood aan de oprichting van een medicatiecommissie
- ❖ Maak telkens op de medische fiche en in het patiëntendossier duidelijk welke patiënten medicatie via de sonde toegediend krijgen (m.b.v. tekst of pictogram)
 - ⇒ Arts en andere personeelsleden op de hoogte brengen van aanwezigheid sonde
 - ⇒ Ook toeleverende apothekers op hoogte brengen van aanwezigheid sonde!



- ❖ Zet labels 'niet pletten' op verpakking (indien nog niet gedaan door apotheker) + duid op medische fiche aan welke medicatie niet mag geplet worden (tekst of pictogram) 
- ❖ Stel voldoende materiaal voor medicatietoediening ter beschikking van de uitvoerende personeelsleden (handschoenen, mondmaskers,...)
- ❖ Stimuleer personeelsleden die medicatie voorbereiden/toedienen, om bij deze taak een "niet-storen-hesje" of iets dergelijks te dragen, zodat het voor iedereen duidelijk is dat die persoon bezig is met medicatie en dus niet mag worden gestoord (fouten vermijden!)
- ❖ Voorzie follow-up van medicatietoediening: observeer at random de voorbereiding en toediening van medicatie (via sonde):
 - Ga na of de protocollen goed wordt opgevolgd
 - Ga na of er problemen zijn i.v.m. medicatietoediening
 - Stel u op als aanspreekpunt voor eventuele problemen of moeilijkheden
- ❖ Organiseer opleiding, evt. samen met toeleverende apotheker en/of arts + volg de opleidingsinitiatieven op
- ❖ Organiseer een "medicatie-spreekuur": personeelsleden kunnen op dat moment vrij naar de medische dienst komen als ze vragen hebben omtrent medicatie

- ❖ Zorg dat er voldoende algemene informatie over geneesmiddelen beschikbaar is voor de belanghebbende personeelsleden, zoals bijsluiters of een pc waarmee internetbronnen geraadpleegd kunnen worden (zie verder bij ‘Nuttige bronnen’)
- ❖ Gebruik een “communicatieschriftje” met de toeleverende apotheker om medicatie-gerelateerde zaken in mee te delen, te vragen,...
- ❖ Organiseer multidisciplinair overleg:
 - Bekijk de therapie van de bewoners (“review”) met arts, apotheker, personeelsleden van de leefgroep van de betrokken bewoner, diëtist, ...
 - Bespreek medicatie-gerelateerde zaken specifiek voor de bewoner, bv. indien het om een bewoner onder vochtbeperking gaat, afspraken hierover maken met medische dienst, diëtist, ...
 - Een jaarlijkse evaluatie van het volledige medicatieproces → punten in dit proces identificeren die moeten verbeteren & actiepunten voorstellen
- ❖ Voorzie duidelijke medicatiefiches:
 - Geen zaken doorstrepen en verbeteren → in dit geval een nieuwe medicatiefiche voorzien
 - Alle geneesmiddelen erop vermelden (op voorschrift, OTC)
 - Zou volgende onderdelen moeten bevatten:
 - Naam, geboortedatum, gewicht
 - Allergieën
 - Eventuele aanwezigheid sonde (welke? gastrostomie, jejunostomie,...; + grootte? bv. 14C h)
 - Route via dewelke het geneesmiddel moet worden gegeven (bv. via sonde)
 - Datum meest recente aanpassing van de medicatiefiche
 - Naam geneesmiddel & naam actief bestanddeel (tenzij combinatiepreparaat) (kan handig zijn voor de personeelsleden indien er een andere verpakking wordt gegeven bv. → personeel kan controleren a.d.h.v. actief bestanddeel)
 - Toedieningsvorm (siroop, tablet,...)
 - ‘Sterkte’ toedieningsvorm (bv. Depakine siroop 300mg/5ml, of Lamictal tabl. 50mg)
 - Toe te dienen dosis
 - Toedienmomenten (evt. het uur erbij); bij minder frequente medicatie (bv. 1x/maand) de datum vermelden
 - Bijzonderheden m.b.t. toedieningstijdstip, bv. voor/tijdens/na eten, ...
 - Startdatum en eventuele stopdatum noteren
 - Evt. indicatie

- Andere bijzonderheden m.b.t. voorbereiding en/of toediening, bv. volume waarmee geneesmiddel verdunnen/oplossen
- Maak evt. onderscheid tussen chronische medicatie (=onderhoudsmedicatie), acute medicatie (=tijdelijke medicatie), en incident medicatie (bv. bij epilepsie-aanval)
- Bij wijzigingen: zorg dezelfde dag nog voor een nieuwe medicatiefiche
- ❖ Ter informatie: enkele mogelijke materialen/hulpmiddelen (te krijgen bij apotheek):
 - Dopje voor spuiten → vermijden dat personeelsleden hun vinger op het uiteinde van de spuit houden (hygiëne, contaminatie) 
 - Dop voor flessen: er bestaan doppen voor flessen van vloeibare medicatie, waarop een spuit past → geneesmiddel kan rechtstreeks in spuit worden opgetrokken + op die manier vermijden dat het vloeibaar geneesmiddel in een potje wordt gegoten waaruit de benodigde hoeveelheid wordt opgetrokken, om daarna de overschot terug in de fles te gieten 
 - Plettoestellen 
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- Er bestaan verschillende soorten toestellen
- Idealiter is er per bewoner 1 eigen plettoestel (indien er medicatie moet worden geplet bij deze bewoner)
- Indien er slechts 1 plettoestel ter beschikking is in de leefgroep, tussen iedere bewoner goed afkuisen en afdrogen! (cross-contaminatie vermijden!)
- ⇒ Indien mogelijk dient pletten zoveel mogelijk vermeden te worden, en dienen vloeibare of oplosbare alternatieven te worden gebruikt/aangemoedigd
- Enterale/orale spuiten:
 - Om het risico op misconnectie te vermijden (IV↔oraal)
 - Er bestaan ook amberkleurige spuiten (lichtprotectie)
 - Meer informatie zie:
 - <http://www.eurosteriel-medical.nl/content/iso-norm-enterale-spuiten>
 - <http://www.bd.com/hypodermic/products/enteral/>
 - http://www.cobra-medical.nl/uploadedfiles/2-foldervygonnutrisafe_versie2.pdf

- http://www.baxter.be/nl/beroepsbeoefenaar/producten/parenterale_voeding/orale-enterale-accessoires-sputen.html (inloggen via DocCheck)


❖ Nuttige bronnen:

- Algemeen i.v.m. medicatie:
 - www.pletmedicatie.be (VZA)
 - www.apotheek.nl
 - www.bcfi.be
 - E-learningcursussen van het Nederlandse Instituut voor Verantwoord Medicatiegebruik (specifiek voor begeleiders in de gehandicaptenzorg, over medicatie in het algemeen):
 - '[Duidelijkheid over Medicijngebruik deel 1 - Basiskennis](#)': belangrijkste begrippen en aandachtspunten op het gebied van medicatie en medicatieveiligheid leren (via www.medicijngebruik.nl → Zoek in ons aanbod → selecteer 'begeleider' bij 'Doelgroep' & 'e-learning/nascholing' bij 'Type product' → Toon resultaten)
 - '[Duidelijkheid over Medicijngebruik deel 2 - Medicijn groepen](#)': kennis maken met belangrijkste medicijnen en medicijn groepen en leren hoe deze medicijnen goed en veilig gebruikt worden (via www.medicijngebruik.nl → Zoek in ons aanbod → selecteer 'begeleider' bij 'Doelgroep' & 'e-learning/nascholing' bij 'Type product' → Toon resultaten)
 - [Geneesmiddelinformatie in zorginstellingen](#) (GIP-z) (Healthbase): met GIP-z biedt u patiënten in het ziekenhuis, GGZ of verpleeghuis begrijpelijke informatie over hun geneesmiddelen (meer informatie zie <http://www.healthbase.nl/bestellen/gip-z/>)
- Specifiek over medicatie via sonde:
 - White R. & Bradnam V. (2007) Handbook of Drug Administration via Enteral Feeding Tubes. Pharmaceutical Press
 - Bankhead R., Boullata J., Brantley S., Corkins M., Guenter P., Krenitsy J. et al. (2009) A.S.P.E.N. Enteral nutrition practice recommendations. JPEN Journal of Parenteral and Enteral Nutrition 33, 122–67
 - Databank Oralia (www.oralia.nl) (KNMP)
 - [Handboek Enteralia (Zwolle, NL)]
- Medicatiebeleid:

- Zorg zelf voor Betere Medicatieveiligheid (Vilans) → handvatten voor het opzetten van een verbetertraject en het meten van medicatieveiligheid binnen de eigen organisatie
(pdf-document te downloaden via <http://www.kennispleingehandcaptensector.nl/gehandicaptenzorg/Product-Toolkit-Zorg-zelf-voor-Betere-Medicatieveiligheid.html>)
- Slik geen medicatiefouten (Vilans) → tips om medicatiefouten te voorkomen
(pdf-document te downloaden via google of via <http://www.invoorzorg.nl/ivz/literatuur-slik-geen-medicatiefouten.html>)
- Handreiking Medicatiebeleid Gehandicaptenzorg (Vereniging Gehandicaptenzorg Nederland) → om het proces van voorschrijven en verstrekken van medicatie te structureren en bewaken
(pdf-document te downloaden via <http://www.kennispleingehandcaptensector.nl/gehandicaptenzorg/Product-Handreiking-Medicatiebeleid-Gehandicaptenzorg.html>)

MOGELIJKE AANDACHTSPUNTEN EN ADVIEZEN VOOR TOELEVERENDE APOTHEKER I.V.M. MEDICATIETOEDIENING IN INSTELLINGEN VOOR PERSONEN MET MENTALE BEPERKING

Onderstaande mogelijke aandachtspunten en adviezen i.v.m. medicatietoediening in instellingen voor personen met mentale beperking zijn opgesteld op basis van observationeel onderzoek en op basis van aanbevelingen uit de literatuur. Het betreft algemene adviezen; deze zijn dus niet specifiek aangepast aan de werking van uw instelling. Wij bieden u deze vrijblijvend aan, zodat u kan bekijken wat er haalbaar en nuttig is voor uw concrete situatie.

- ❖ Noteer in het patiëntendossier duidelijk welke patiënten medicatie via sonde toegediend krijgen
- ❖ Zet labels 'niet pletten' op verpakking van niet-pletbare geneesmiddelen 
- ❖ Lever de gevraagde medicatie op de correcte wijze aan, nl. alle geneesmiddelen voorzien van de naam van de patiënt en in geval van meerdere geneesmiddelen per patiënt deze geneesmiddelen samen verpakken op naam
- ❖ Sluit overeenkomsten met de instelling waar u levert omtrent:
 - Uw rol in de instelling:
 - in het volledige medicatieproces (=volledig systeem van voorschrijven tot toedienen van medicatie aan bewoner & follow-up) → (bv. 1x/jaar aanwezig bij vergadering omtrent dit proces)
 - m.b.t. het mee ontwikkelen van de procedures en protocollen over medicatie
 - in het bekijken van de therapie van de patiënt ("review")
 - i.v.m. opleiding over medicatie: zorg voor scholing van het personeel van de instelling
 - Communicatie met de instelling, bv.
 - hoe en wie contacteren bij dringende zaken
 - organiseer een "medicatie-sprekuur" (frequentie zelf te bepalen): personeelsleden van de voorziening kunnen u op het afgesproken moment contacteren/langskomen als ze niet-dringende vragen hebben omtrent medicatie
 - gebruik een "communicatieschriftje" om medicatie-gerelateerde zaken in mee te delen, uit te leggen,... naar de instelling toe
- ❖ Zorg dat er voldoende algemene informatie over geneesmiddelen beschikbaar is in de instelling
 - Zoals bijsluiters, nuttige sites,...
 - Zie ook hieronder bij "Nuttige bronnen"
- ❖ Nuttige bronnen:
 - Algemeen i.v.m. medicatie:

- www.pletmedicatie.be (VZA)
- www.apotheek.nl (nuttig voor personeelsleden in de instelling)
- www.bcfi.be
- E-learningcursussen van het Nederlandse Instituut voor Verantwoord Medicatiegebruik (specifiek voor begeleiders in de gehandicaptenzorg, over medicatie in het algemeen):
 - '[Duidelijkheid over Medicijngebruik deel 1 - Basiskennis](#)': belangrijkste begrippen en aandachtspunten op het gebied van medicatie en medicatieveiligheid leren (via www.medicijngebruik.nl → Zoek in ons aanbod → selecteer 'begeleider' bij 'Doelgroep' & 'e-learning/nascholing' bij 'Type product' → Toon resultaten)
 - '[Duidelijkheid over Medicijngebruik deel 2 - Medicijn groepen](#)': kennis maken met belangrijkste medicijnen en medicijn groepen en leren hoe deze medicijnen goed en veilig gebruikt worden (via www.medicijngebruik.nl → Zoek in ons aanbod → selecteer 'begeleider' bij 'Doelgroep' & 'e-learning/nascholing' bij 'Type product' → Toon resultaten)
- [Geneesmiddelinformatie in zorginstellingen](#) (GIP-z) (Healthbase): met GIP-z biedt u patiënten in het ziekenhuis, GGZ of verpleeghuis begrijpelijke informatie over hun geneesmiddelen (meer informatie zie <http://www.healthbase.nl/bestellen/gip-z/>)
- Specifiek over medicatie via sonde:
 - White R. & Bradnam V. (2007) Handbook of Drug Administration via Enteral Feeding Tubes. Pharmaceutical Press
 - Bankhead R., Boullata J., Brantley S., Corkins M., Guenter P., Krenitsy J. et al. (2009) A.S.P.E.N. Enteral nutrition practice recommendations. JPEN Journal of Parenteral and Enteral Nutrition 33, 122–67
 - Databank Oralia (www.oralia.nl) (KNMP)
 - [Handboek Enteralia (Zwolle, NL)]
- Medicatiebeleid:
 - [Zorg zelf voor Betere Medicatieveiligheid](#) (Vilans) → handvatten voor het opzetten van een verbetertraject en het meten van medicatieveiligheid binnen de eigen organisatie
(pdf-document te downloaden via <http://www.kennispleingehandcaptensector.nl/gehandicaptenzorg/Product-Toolkit-Zorg-zelf-voor-Betere-Medicatieveiligheid.html>)
 - [Slik geen medicatiefouten](#) (Vilans) → tips om medicatiefouten te voorkomen

(pdf-document te downloaden via google of via <http://www.invoorzorg.nl/ivz/literatuurslik-geen-medicatiefouten.html>)

- Handreiking Medicatiebeleid Gehandicaptenzorg (Vereniging Gehandicaptenzorg Nederland) → om het proces van voorschrijven en verstrekken van medicatie te structureren en bewaken

(pdf-document te downloaden via

<http://www.kennispleingehandicaptensector.nl/gehandicaptenzorg/Product-Handreiking-Medicatiebeleid-Gehandicaptenzorg.html>

APPENDIX 4: EDUCATIONAL SESSION



UNIVERSITEIT GENT
FACULTEIT FARMACEUTISCHE WETENSCHAPPEN

MEDICATIETOEDIENING VIA SONDE IN INSTELLINGEN VOOR PERSONEN MET MENTALE BEPERKING



Apr. Elke Joos
Eenheid Farmaceutische Zorg
Faculteit Farmaceutische Wetenschappen
Universiteit Gent

ALGEMEEN

- Toenemende aandacht voor veilig medicatiegebruik in verschillende gezondheidszorgsectoren
 - Instellingen personen met mentale beperking (PMB) :
Toediening medicatie vaak door niet-medisch geschoold personeel
 - Personen MB:
 - Meer gezondheidsproblemen → meer geneesmiddelen (GMn)
 - Vaak slikproblemen → sonde
- => Risico op fouten ↑

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ALGEMEEN – medicatie via sonde

- Resultaten onderzoek in Vlaamse instellingen PMB:
 - Aanbevelingen voorbereiding & toediening medicatie via sonde vaak niet gevolgd
 - Redenen waarom niet gevolgd
(o.a. gebrek aan kennis, materiaal, duidelijke richtlijnen)
 - Kennis beperkt

***Optimaliseren medicatietoediening via sonde?
→ Opleiding personeel belangrijk onderdeel !***

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DOEL OPLEIDING

- Aanbevelingen i.v.m. voorbereiding & toediening van medicatie via sonde
- Belang van correct opvolgen

=> *Kwaliteit medicatietoediening en zorg* ↑

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Opleiding: overzicht

- Voorbereiden medicatie via sonde:
 - › Meest geschikte toedieningsvorm kiezen
 - › Schudden van vloeibare medicatie
 - › Pletten van medicatie
 - › Capsules/gelules
 - › Verdunnen van vaste/vloeibare medicatie
 - › Niet mengen
- Toedienen medicatie via sonde:
 - › Stop sondevoeding
 - › Helling rugleuning
 - › Naspoelen recipient
 - › Spoelen van de sonde
- Algemene opmerkingen

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Meest geschikte toedieningsvorm kiezen

▪ Mogelijke toedieningsvormen via sonde:

▸ *Vast*

- Tabletten
- Capsules/gelules
- Poeders

▸ *Vloeibaar*

- Oplossingen
- Suspensies & emulsies

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Meest geschikte toedieningsvorm kiezen

▪ *Tabletten*

- Gewone tabletten ('oplosbare'/'niet-'oplosbare')
- ~~Tabletten met snijrand~~ *snijrand afgifte (zie verder)*
- ~~Maagsonderende tabletten~~ *(zie verder)*
- Bruistabletten (uitbruisen!)
- (Smelttabletten)
- ~~Snijtabletten~~



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* *Tenzij toegediend voorbij maag (in darmen)*

Meest geschikte toedieningsvorm kiezen

▪ Mogelijke toedieningsvormen via sonde:

▸ *Vast*

- Tabletten
- Capsules/gelules
- Poeders

▸ *Vloeibaar*

- Oplossingen
- Suspensies & emulsies

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Meest geschikte toedieningsvorm kiezen

▪ Capsules/gelules

- Gewone capsules
- Capsules ~~met harde afgifte~~
- Maagsonderst ~~capsules~~
- Harde gelatine capsules
- Zachte ~~capsules~~



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Meest geschikte toedieningsvorm kiezen

▪ Mogelijke toedieningsvormen via sonde:

▸ Vast

- Tabletten
- Capsules/gelules
- Poeders

▸ Vloeibaar

- Oplossingen
- Suspensies & emulsies

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Meest geschikte toedieningsvorm kiezen

▪ Poeders



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Meest geschikte toedieningsvorm kiezen

▪ Mogelijke toedieningsvormen via sonde:

▸ *Vast*

- Tabletten
- Capsules/gelules
- Poeders

▸ *Vloeibaar*

- Oplossingen
- Suspensies & emulsies

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Meest geschikte toedieningsvorm kiezen

▪ *Vloeibare vormen*

- Oplossing (helder)
 - Siroop
 - Druppels
- Suspensie & emulsie (troebel)



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Meest geschikte toedieningsvorm kiezen

▪ *Meest geschikte vormen:*

- ✓ Vloeibare vormen
- ✓ Gewone tabletten: oplosbare

▪ *In praktijk:*

- ✓ Aan arts & apr. melden 'sondepatiënt'
- ✓ Eventuele problemen signaleren

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- Algemene opmerkingen

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Schudden van vloeibare medicatie

- *Welke vloeibare vormen moet je schudden?*
 - Suspensies
 - Emulsies
- *Waarom?*
 - Uitzakken vermijden *
 - Gelijke verdeling geneesmiddel in vloeistof
=> Correcte dosis
- *Voorbeelden*
 - Motilium®, Tegretol®, antibiotica, Gaviscon®, omeprazole

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Schudden van vloeibare medicatie



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Schudden van vloeibare medicatie

In praktijk:

- ✓ Alle vloeibare medicatie schudden
→ omzwenken (5-tal keer)
- ✓ Instructies medische dienst of apr. volgen/vragen
- ✓ Bijsluiter lezen

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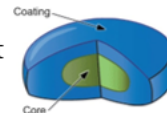
Pletten van medicatie

- *Enkel als laatste toevlucht!*
 - Voorkeur geven aan vloeibare/oplosbare vormen
 - Goed pletten (°fijn poeder) => verstopping vermijden
- *Mag je zomaar alle geneesmiddelen pletten?*
Neen!!!
 - 1) Maagsapresistente tabletten
 - 2) Tabletten met vertraagde afgifte
 - 3) Preparaten met antibiotica, hormonen, steroïden

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Pletten van medicatie – *maagsapresistente tabletten*

- Bv.: Losec Mups, Nexiam E.C. (Enteric Coated)
- Doel: geneesmiddel (GM) pas vrijstellen in darm:
 - GM tast de maag niet aan
bv. Asaflow®
 - GM kan zijn werking t.h.v. darm uitoefenen
bv. medicatie voor behandeling van inflammatoir darmlijden
 - GM wordt niet afgebroken door het zure maagsap
bv. omeprazole
- Werking via speciale film rond bv. tablet



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Pletten van medicatie – *maagsapresistente tabletten*

- Bij pletten: breken van film
 - ⇒ GM komt ook al in maag vrij
 - Maaglast
 - Minder werking t.h.v. darm
 - Afbraak van GM

▪ Wat doen?

- Niet pletten! *
- Medische dienst contacteren: zoeken naar alternatief
bv. vloeibare vorm, poeder, ander GM met zelfde werking, andere voorbereidingswijze,...



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Pletten van medicatie – *tabletten met vertraagde afgifte*

- Op verpakking:

| | |
|---|---|
| <ul style="list-style-type: none"> ○ Chrono ○ CR (<u>Controlled Release</u>) ○ Diff (<u>Diffucaps</u>) ○ Dur (<u>Durettes</u>) ○ FAS (<u>Facilitated Absorption System</u>) ○ HBS (<u>Hydrodynamic Balance System</u>) ○ LA (<u>Long Acting</u>) ○ OROS (<u>Oral Resorption Osmotic System</u>) | <ul style="list-style-type: none"> ○ <u>Perlongettes</u> ○ PL (<u>Pro Longatum</u>) ○ Retard ○ SA (<u>Slow Action</u>) ○ UNI ○ UNO ○ ZOK (<u>Zero Order Kinetic</u>) |
|---|---|

→ Bv. Carbamazepine CR, Depakine Chrono

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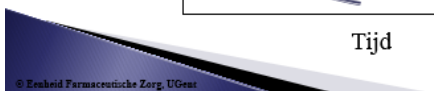
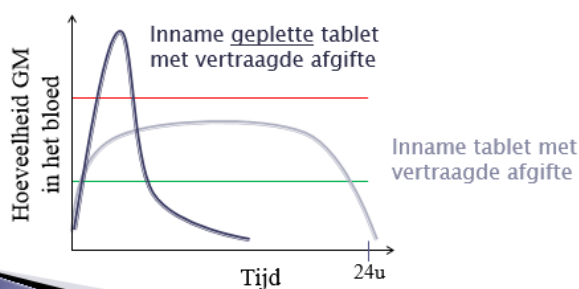
Pletten van medicatie – *tabletten met vertraagde afgifte*

- Doel: GM niet in 1 keer vrijstellen, maar over een langere periode (bv. 24 uur) gecontroleerd vrijstellen
 - Bewoner moet minder frequent GM innemen (door lange werking)
 - Piekconcentraties in bloed worden vermeden
=> bijwerkingen ↓
- Werking via speciale film rond bv. tablet



Pletten van medicatie – *tabletten met vertraagde afgifte*

- Bij pletten: film wordt verbroken
⇒ GM komt in 1 keer vrij



Pletten van medicatie – *tabletten met vertraagde afgifte*

- **Wat doen?** 
 - Niet pletten!
 - Medische dienst contacteren: zoeken naar alternatief bv. vloeibare vorm, poeder, ander GM met zelfde werking,...



Pletten van medicatie –

preparaten met antibiotica, hormonen, steroïden

- Pletten in principe geen probleem
- MAAR ... bij pletten kan poeder verstuiven
 - Inademen door het personeelslid
 - Risico voor eigen gezondheid personeelslid
 - Vooral opletten bij zwangerschap!!
- Wat doen?
 - Voorzorgen nemen bij pletten: handschoenen & mondmasker
 - Medische dienst contacteren bij twijfel omtrent eigen gezondheid
 - Vragen aan medische dienst of alternatief haalbaar is



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Pletten van medicatie –

opmerkingen bij het pletten



- Zorg dat alles volledig is toegediend, ook restjes
- Pletmateriaal na gebruik telkens goed afkuisen en afdrogen
 - Zeker als 1 toestel voor meerdere bewoners!

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Pletten van medicatie

In praktijk:

- Instructies medische dienst opvolgen
- Maagsapresistente* & vertraagde afgifte tabletten:
 - ✓ Niet pletten!
 - ✓ Medische dienst contacteren: zoeken naar alternatief
- Antibiotica, hormonen, steroïden :
 - ✓ Voorzorgen bij pletten: handschoenen & mondmasker
 - ✓ Vragen aan medische dienst of alternatief haalbaar is
- Bij twijfel: evt. eerst www.pletmedicatie.be raadplegen



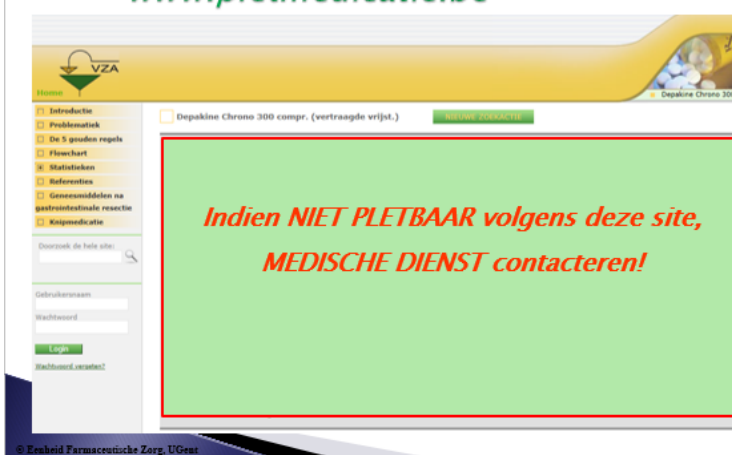
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Pletten van medicatie – *www.pletmedicatie.be*



Pletten van medicatie – *www.pletmedicatie.be*



Opleiding: overzicht

- Voorbereiden medicatie via sonde:
 - ▶ Meest geschikte toedieningsvorm kiezen
 - ▶ Schudden van vloeibare medicatie
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 - ▶ Capsules/gelules
 - ▶ Verdunnen van vaste/vloeibare medicatie
 - ▶ Niet mengen
- Toedienen medicatie via sonde:
 - ▶ Stop sondevoeding
 - ▶ Helling rugleuning
 - ▶ Naspoelen recipiënt
 - ▶ Spoelen van de sonde
- Algemene opmerkingen

Capsules/gelules

- Zachte capsule?
 - Niet ideaal => alternatief zoeken
- Harde capsule?
 - Capsule openen
 - Inhoud mengen met water
- Waarom harde capsule openen?
 - Gelatine-omhulsel kan sonde verstoppen



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Capsules/gelules

- *Mogen alle harde capsules geopend worden?*

Neen!!!

- 1) Maagsapresistente capsules *
- 2) Capsules met vertraagde afgifte
→ *idem als bij tabletten*

Bv.: Redomex Diffucaps, Prolopa HBS

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* Tenzij toegediend voorbij maag (in darmen)

Capsules/gelules

In praktijk:

- Instructies medische dienst opvolgen
- Harde capsules openen & inhoud mengen met water
- Maagsapresistente* & vertraagde afgifte capsules:
 - ✓ Niet openen!
 - ✓ Medische dienst contacteren: zoeken naar alternatief
- Bij twijfel: evt. eerst www.pletmedicatie.be raadplegen

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* Tenzij toegediend voorbij maag (in darmen)

Opleiding: overzicht

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Verdunnen van vaste/vloeibare medicatie

- Vaste medicatie
 - Mengen met minstens 10 ml water
 - Waarom? Vloeibaar maken van vaste vorm
- Vloeibare medicatie
 - Verdunnen met minstens gelijke hoeveelheid water
 - Waarom?
 - Vlot door sonde laten lopen (viscositeit ↓)
=> kans op verstopping ↓
 - Kans op krampen en diarree ↓
- Aanbevelingen voor kinderen:
 - Minstens 5 ml water
 - Minimum met minstens gelijke hoeveelheid water

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Verdunnen van vaste/vloeibare medicatie

- Haalbaar?
 - Vast: ok, logisch
 - Vloeibaar??
 - Vochtbeperking (kinderen, kleine maaginhoud,...)?
 - Alle vloeibare vormen? Met gelijke hoeveelheid?
- ⇒ *individueel bepalen* (medische dienst)

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Verdunnen van vaste/vloeibare medicatie

In praktijk:

- Instructies medische dienst opvolgen
(cfr. vochtbeperking,...)
- Basisprincipes verdunnen:
 - ✓ *Vast*: mengen met minstens 10 ml water
 - ✓ *Vloeibaar*: verdunnen met minstens gelijke hoeveelheid water, zeker de dik vloeibare vormen
 - Minder voor kinderen (minstens 5 ml)

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 - **Niet mengen**
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Niet mengen

- *Geneesmiddelen niet met mekaar mengen*
 - Bij voorbereiding
 - Bij toedienen
- *Waarom?*
 - Onverwachte reacties met mekaar vermijden

In praktijk:

- Instructies medische dienst opvolgen
- Geneesmiddelen apart voorbereiden en toedienen

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Stop sondevoeding

- *Géén medicatie mengen met sondevoeding!!*
- *Als sondevoeding loopt:*
 - Sondevoeding op pauze zetten tijdens medicatietoediening
 - Bij sommige GM: langer wachten voor voeding terug mag worden gestart, bv. fenytoïne
- *Waarom?*
 - Reacties tussen voeding en geneesmiddel vermijden

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Stop sondevoeding

In praktijk:

- Medicatie niet mengen met sondevoeding
- Sondevoeding op pauze bij medicatietoediening
- GM waarbij grotere pauze nodig? Instructies medische dienst opvolgen

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Helling rugleuning

- *Rugleuning minstens 30°*
 - › Tenzij medische contra-indicaties (bv. onstabiele wervelkolom)
→ evt. volledige lichaam op 30° indien mogelijk
- *Waarom?*
 - › Reflux verminderen
 - › Bevorderen voortgang vloeistof m.b.v. zwaartekracht



In praktijk:

- › Rugleuning min. 30° (indien mogelijk)

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Opleiding: overzicht

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Naspoelen recipiënt

- Spoel recipiënt waarin GM voorbereid / waarmee GM toegediend (potje, spuit,...) met water & dien dit spoelwater toe
 - Volledige dosis toegediend
- Recipiënt (potjes, spuiten,...) nadien goed afkuisen
 - Zeker indien gezamenlijk gebruikte recipiënten!

In praktijk:

- Recipiënt naspoelen & spoelwater toedienen

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Spoelen van de sonde

- Spoelvloeistof? Water (geen cola! ~ zuurtegraad)
- Wanneer sonde spoelen?
 - voor
 - tussen
 - na

medicatie-toediening → telkens met minstens 10 à 15ml water
- Waarom?
 - Reactie met mekaar (GMn), met voeding, en met sonde vermijden
 - ⇒ Verstopping van de sonde voorkomen
 - ⇒ Levensduur sonde verlengen

FG

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Spoelen van de sonde

In praktijk:

- Instructies medische dienst opvolgen
(cfr. vochtbeperking,...)
- Basisprincipes spoelen:
 - ✓ *Voor:* met minstens 15 ml water
 - ✓ *Tussen:* met minstens 10 ml water
 - ✓ *Na:* met minstens 15 ml water
 - Minder voor kinderen (minstens 5 ml)

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Opleiding: overzicht

- Voorbereiden medicatie via sonde:
 - Meest geschikte toedieningsvorm kiezen
 - Schudden van vloeibare medicatie
 - Pletten van medicatie
 - Capsules/gelules
 - Verdunnen van vaste/vloeibare medicatie
 - Niet mengen
- Toedienen medicatie via sonde:
 - Stop sondevoeding
 - Helling rugleuning
 - Naspoelen recipiënt
 - Spoelen van de sonde
- Algemene opmerkingen

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ALGEMENE OPMERKINGEN (1 / 4)

- *Handen wassen!*
 - Voor & na voorbereiding/toediening medicatie
 - Hygiëne & veiligheid (bewoner en bereider)
- *Water op kamertemperatuur (lauw) gebruiken*
 - Koud water = braken/krampen
- *Geneesmiddel toedienen aan juiste bewoner*
 - Bij klaarzetten: medicatie van elke bewoner goed afscheiden van de rest
 - Voor toediening: nog eens naam van bewoner controleren

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ALGEMENE OPMERKINGEN (2/4)

- *Medicatie best pas net voor toediening klaarzetten*
 - Reden: invloed op stabiliteit,...
 - In afgesloten, niet-lichtdoorlatende potjes/spuiten
 - Met duidelijke identificatie bewoner!
 - Let op veiligheid! (achter slot)
- *Opletten met klaarzetten*
 - Zorg voor controle, goede afspraken, ...
- *Medicatie juist bewaren*
 - Zo lang mogelijk in oorspronkelijke verpakking
 - Koelkast

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ALGEMENE OPMERKINGEN (3/4)

- *Wat doen bij verstopping sonde?*
 - Stappenplan:
 - Eerst spoelen met water (evt. pulsatiel)
 - Sonde 5min. afklemmen (of langer indien nodig); opnieuw pulsatiel spoelen
 - ***Als sonde verstopt blijft → medische dienst contacteren!***
 - Niet spoelen met cola, koolzuurhoudende dranken
 - ! Pancreasenzymen helpen enkel bij verstopping door voedsel!
 - *Preventie = beste methode!*

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ALGEMENE OPMERKINGEN (4/4)

- *Ter info:*
 - Dopje spuit
 - Bij voorbereiding
 - Net voor toedienen: omzwenken spuit



Bij onduidelijkheden, medische dienst contacteren!

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NUT AANBEVELINGEN

Vorbereiding & toediening van medicatie via sonde

- optimaliseren
- op 1 lijn krijgen (=> variatie in werkwijzen ↓)

⇒ *Welzijn bewoners* ↑

NOOT: Er bestaan variaties op deze aanbevelingen.

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Bedankt voor uw aandacht!

Vragen?

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Eenheid Farmaceutische Zorg

Faculteit Farmaceutische Wetenschappen

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BRONNEN i.v.m. medicatie via sonde

- Handbook of Drug Administration via Enteral Feeding Tubes (White & Bradnam)
 - Engelstalig
- www.pletmedicatie.be (VZA)
- Databank Oralia (www.oralia.nl) (KNMP)
 - Nederlandstalig
 - Te betalen abonnement

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Bronnen

- Bankhead R., Boullata J., Brantley S., Corkins M., Guenter P., Krenitsy J. *et al.* (2009) A.S.P.E.N. Enteral nutrition practice recommendations. *JPEN Journal of Parenteral and Enteral Nutrition* **33**, 122-67.
- White R. & Bradnam V. (2007) Handbook of Drug Administration via Enteral Feeding Tubes Pharmaceutical Press.
- E. Joos, E. Mehuys, J. Van Bocxlaer, J. P. Remon, M. Van Winckel and K. Boussey. Drug administration via enteral feeding tubes in residential care facilities for individuals with intellectual disability: an observational study. *J Intellect Disabil Res* 2015;59:215-225. DOI: 10.1111/jir.12129.
- E. Joos, I. Van Tongelen, K. Wijnants, E. Mehuys, J. Van Bocxlaer, J. P. Remon, M. Grypdonck, M. Van Winckel and K. Boussey. Drug administration via enteral feeding tube in residential care facilities for individuals with intellectual disability: a focus group study on guideline implementation. (*in submission*)

APPENDIX 5: FLOWCHART MEDICATION ADMINISTRATION THROUGH EFT

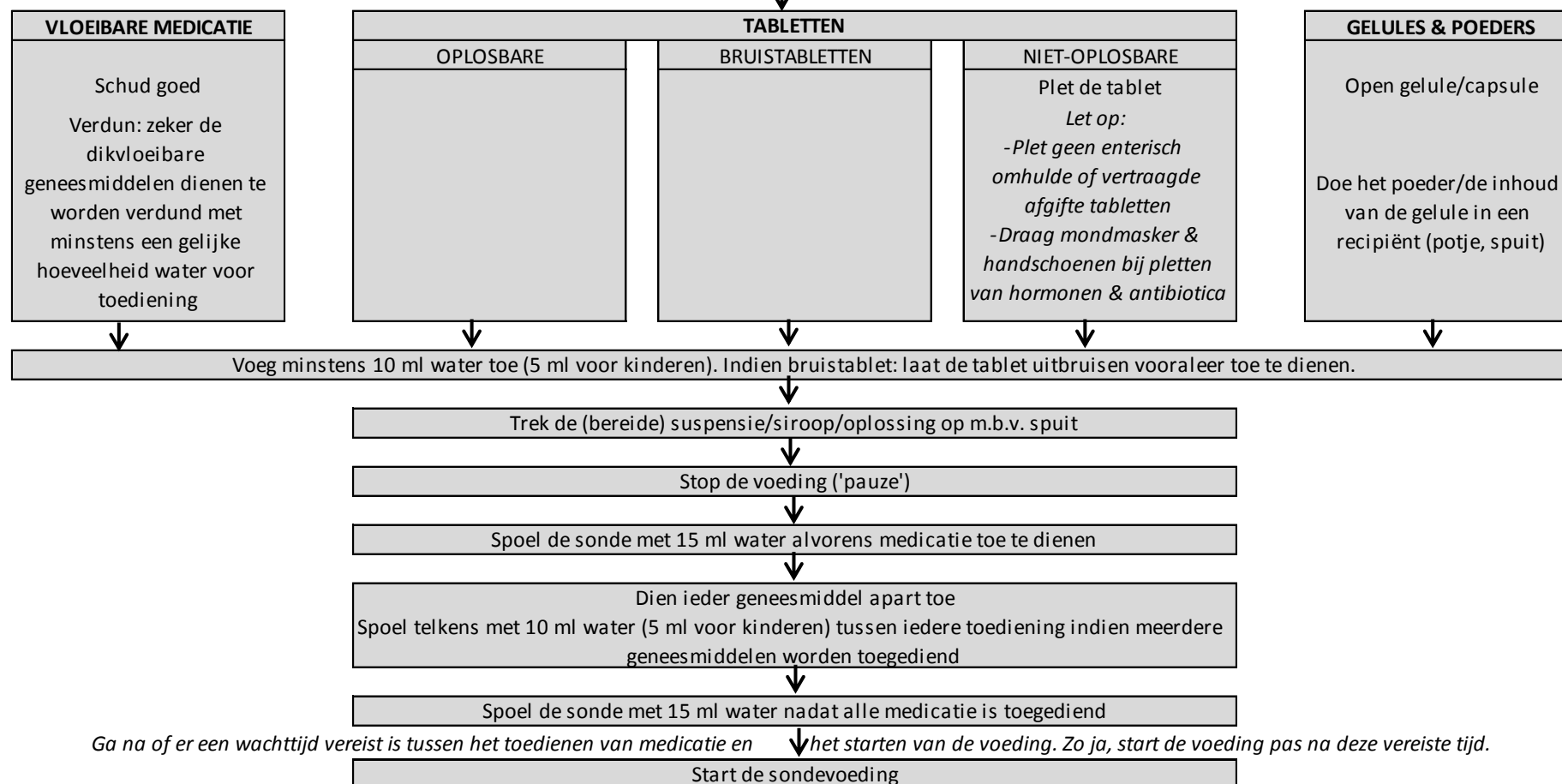
MEDICATIETOEDIENING VIA SONDE - flowchart voor toedienend personeel

* Ga na of medicatie via de mond in te nemen is
 * Voeg geen medicatie toe aan de sondevoeding
 * Vraag de medische dienst advies wanneer het om een bewoner gaat onder vochtbeperking of een kind, aangezien de nodige verdunnings- en spoelvolumes mogelijks moeten worden aangepast. Of volg de gegeven instructies hieromtrent op.

Ga na of er een wachttijd vereist is tussen het stoppen van de voeding en het toedienen van medicatie. Zo ja, stop tijdig de voeding.

Verzamel de medicatie en de nodige materialen (bv. spuiten, handschoenen, water)

Bereid ieder geneesmiddel apart voor. Meng de geneesmiddelen niet (tenzij anders geadviseerd door medische dienst of apotheker).



Aanbevelingen in flowchart gebaseerd op:

- ◊ Bankhead R., Boullata J., Brantley S., Corkins M., Guenter P., Krenitsy J. et al. (2009) A.S.P.E.N. Enteral nutrition practice recommendations. JPEN Journal of Parenteral and Enteral Nutrition 33, 122–67.
- ◊ White R. & Bradnam V. (2007) Handbook of Drug Administration via Enteral Feeding Tubes Pharmaceutical Press.
- ◊ British Association for Parenteral and Enteral Nutrition (2013) Administering Drugs Via Enteral Feeding Tubes – A Practical Guide.
- ◊ Boullata J. I. & Hudson L. M. (2012) Drug-nutrient interactions: a broad view with implications for practice. Journal of the Academy of Nutrition and Dietetics 112, 506–512.

APPENDIX 6: OVERVIEW OF DRUGS FOR WHICH A PROLONGED BREAK IN ENTERAL FEEDING IS RECOMMENDED

ADVIEZEN OMTRENT INNAMETIJDSTIP VAN ENKELE SPECIFIEKE GENEESMIDDELEN ^c

Dit overzicht bevat:

- (1) geneesmiddelen waarvoor interactie met (sonde)voeding is beschreven
- (2) geneesmiddelen waarbij specifieke adviezen bestaan m.b.t. voedselinname
- (3) enkele courant voorkomende interacties tussen geneesmiddelen die kunnen voorkomen worden door een gescheiden toediening

Opgelet: dit zijn algemene adviezen; bij complexere medicatieschema's blijft overleg met arts en apotheker over specifiek toedieningsadvies aangewezen (en eventuele afwijkingen van deze algemene adviezen).

In bijlage vindt u voor elk geneesmiddel een overzicht van de bronnen waarop onderstaand advies gebaseerd is.

| | | |
|-----------------------------------|--|---|
| Anti-epileptica | <i>Fenytoïne</i> | Stop de voeding 2u voor tot 2u na de toediening van fenytoïne |
| | <i>Carbamazepine</i> | Geen verlengde onderbreking van voeding nodig |
| Gastro-intestinaal stelsel | <i>Antacida</i> | <ul style="list-style-type: none"> ➤ Geen verlengde onderbreking van voeding nodig ➤ Interval van 1 à 2 u met sommige andere geneesmiddelen (zie bijlage, Antacida, Commentaren Medicatiebewaking) |
| | <i>Domperidone</i> | 15 à 30 min voor de voeding innemen (en/of bij het slapengaan) |
| | <i>Protonpompinhibitoren ((es)omeprazole, lansoprazole, pantoprazole)</i> | 15 à 30 min voor de 1 ^e voeding/ontbijt innemen. Indien PPI 2x/dag moet worden ingenomen: 15 à 30 min voor 1 ^e voeding/ontbijt en 15 à 30 min voor laatste voeding/avondmaal |
| Hormonaal stelsel | <i>Schildklierhormonen (levothyroxine)</i> | <ul style="list-style-type: none"> ➤ 30 min voor de 1^e voeding/ontbijt, zonder andere geneesmiddelen ➤ Vermijd gelijktijdige inname met complexerende verbindingen (ijzer, aluminium, magnesium, calcium) => levothyroxine min 3u voor complexerende verbinding |
| Anti-infectieuze middelen | <i>Chinolones (ciprofloxacin, levofloxacin, ofloxacin, moxifloxacin,...)</i> | <ul style="list-style-type: none"> ➤ Stop de voeding minstens 1u voor tot 2u na de toediening van het chinolon ➤ Vermijd gelijktijdige inname met complexerende verbindingen (ijzer, aluminium, magnesium, calcium) en melkproducten => dien het chinolon ten minste 2u voor de complexerende verbinding toe (uitzondering: in geval van moxifloxacin 6u interval) |

^c Dit is een niet-limitatief overzicht

| | | |
|-------------------------------|---|---|
| | <i>Tetracyclines</i> (<i>doxycycline</i> , <i>minocycline</i> , <i>tetracycline</i> ,...) | <ul style="list-style-type: none"> ➤ Stop de voeding minstens 1u voor tot 2u na de toediening van het tetracycline ➤ Vermijd gelijktijdige inname met complexerende verbindingen (ijzer, aluminium, magnesium, calcium) en melkproducten => dien het tetracycline ten minste 2u voor de complexerende verbinding toe |
| | <i>Penicilline V</i> | Stop de voeding minstens 1u voor tot 2u na de toediening van penicilline V |
| Diverse geneesmiddelen | <i>Bisfosfonaten</i> (<i>alendronaat</i> , <i>risedronaat</i> ,...) | <ul style="list-style-type: none"> ➤ 30 min voor 1^e voeding/ontbijt in rechtop zittende houding, met een groot glas leidingwater; niet neerliggen en wachten met eten & drinken tot 30 min na inname bisfosfonaat ➤ Wacht met innemen van andere geneesmiddelen tot 30 min na inname bisfosfonaat |
| | <i>IJzer</i> | <ul style="list-style-type: none"> ➤ Beste absorptie bij inname op nuchtere maag. Echter, er treden dan vaak gastro-intestinale bijwerkingen op; dit kan gereduceerd worden door inname van ijzer met of net na de voeding. ➤ Interval van 2 à 3 u tussen inname ijzer en inname andere geneesmiddelen (voor meer specifieke adviezen zie bijlage: IJzer, Commentaren Medicatiebewaking) <p><i>N.B.:</i> voor ijzer met vertraagde afgifte (Fero-Grad 500®, Fero-Gradumet®, Tardyferon®) wordt mogelijks best overgeschakeld naar ijzer zonder vertraagde afgifte (voor meer specifieke adviezen zie bijlage: IJzer, Commentaren Medicatiebewaking)</p> |
| | <i>Theofylline</i> | Indien mogelijk, dien theofylline toe tijdens een pauze in de voeding. Indien dit praktisch niet haalbaar is, geef altijd op dezelfde manier ten aanzien van voeding (tijdens of erbuiten). |
| | <i>Warfarine</i> | Indien mogelijk, dien warfarine toe tijdens een pauze in de voeding (voeding stoppen 1u voor tot 1u na toediening warfarine). Indien niet mogelijk, zorg dat inname warfarine altijd hetzelfde gebeurt m.b.t. voeding (= timing van voeding en toediening van warfarine altijd op dezelfde manier). Monitor INR. |

BIJLAGE

| FENYTOÏNE | |
|---|--|
| Handbook of Drug Administration via Enteral Feeding Tubes (2011) ¹ | Allow a 2h break without feed: 2h break before and after administration of phenytoin |
| Drug-Nutrient Interactions in Patients Receiving Enteral Nutrition (2010) ² | Hold formula administration for 1–2 h before and after drug administration |
| Wohlt et al. (2009) ³ | Enteral nutrition should be held at least 1h before and 1h after dose administration. Alternatively, the phenytoin dose can be increased to overcome the interaction with enteral feedings. |
| Williams (2008) ⁴ | Stop the enteral feeds for 2h before and after phenytoin administration |

⇒ *Voorstel voor praktijkadvies:* Stop de voeding 2u voor tot 2u na de toediening van fenytoïne

| CARBAMAZEPINE | |
|---|---|
| Handbook of Drug Administration via Enteral Feeding Tubes (2011) ¹ | A prolonged break in feeding is not necessary |
| Drug-Nutrient Interactions in Patients Receiving Enteral Nutrition (2010) ² | Hold formula administration for 2 h before and after drug administration |
| Wohlt et al. (2009) ³ | Coadministration of carbamazepine with food results in increased drug bioavailability. However, in vitro data suggest that the mean recovery of carbamazepine mixed with an enteral nutrient supplement was significantly reduced. Nevertheless, the same total daily dose can be administered but in four equally divided doses of the suspension or tablets. |
| Williams (2008) ⁴ | The exact mechanism of the drug–nutrient interaction is not clear. Close monitoring of serum concentrations is warranted when carbamazepine is given via the enteral route. |

⇒ *Voorstel voor praktijkadvies:* Geen verlengde onderbreking van voeding nodig

| ANTACIDA | |
|--|--|
| Handbook of Drug Administration via Enteral Feeding Tubes (2011) ¹ | Antacids containing aluminium or magnesium hydroxide bind to dietary phosphate to form insoluble phosphate salts, which cannot be absorbed. |
| SKP (Wetenschappelijke bijsluiter) | Gezien de aanwezigheid van calciumcarbonaat, dat werkt als een antacidum, dient men 2 uur te wachten tussen de inname van Gaviscon® en de toediening van andere geneesmiddelen, vooral H2-antihistaminica, tetracyclines, digoxine, fluorochinolonen, ijzerzout, ketoconazol, neuroleptica, thyroxine, penicillamine, bètablokkers (atenolol, metoprolol, propranolol), glucocorticoïden, chloroquine en bisfosfonaten. |
| British National Formulary | Antacids should preferably not be taken at the same time as other drugs since they may impair absorption. Antacids may also damage enteric coatings designed to prevent dissolution in the stomach. |
| <u>www.bcfi.be</u> | Gewijzigde resorptie van andere geneesmiddelen door verandering van de maag-pH (bv. verminderde resorptie van itraconazol, van ijzer en van bepaalde protease-inhibitoren en proteïne-kinase-inhibitoren) of door vorming van niet-resorbeerbare complexen met de antacida (bv. verminderde resorptie van tetracyclines en van chinolonen). Een interval van enkele uren tussen de innames is aangewezen. |
| Commentaren Medicatiebewaking 2014/2015 ⁵ | <p>Interacties beschreven met o.a.:</p> <ul style="list-style-type: none"> • Azoolantimycotica (itraconazole, ketoconazole, posaconazole): mycoticum minstens 2u voor of na het antacidum • Bisfosfonaten: antacidum innemen <ul style="list-style-type: none"> - minstens 0,5u na gebruik alendroninezuur, ibandroninezuur 50mg, risedroninezuur - minstens 1u na gebruik ibandroninezuur 150mg - minstens 2u na gebruik clodroninezuur, etidroninezuur • Chinolonen: voorkeur om het aluminium- en/of magnesium-bevattende verbinding, zoals antacida, (tijdelijk) te stoppen als een chinolon-antibioticum is geïndiceerd OF om één van beide middelen te vervangen door een alternatief (of in geval van moxifloxacin: dien moxifloxacin ten minste 6u voor of 6u na complexerende verbinding in) • IJzer: ijzer minstens 1,5 tot 2u vóór het antacidum • Tetracyclines: overweeg tijdelijk stoppen van de complexerende verbinding (antacidum) OF vervang één van beide middelen OF dien het tetracycline ten minste 2u voor de complexerende verbinding toe • Levothyroxine: complexerende verbinding (antacidum) minstens 3u na levothyroxine innemen |

⇒ *Voorstel voor praktijkadvies:*

- Geen verlengde onderbreking van voeding nodig
- Interval van 1 à 2 u met sommige andere geneesmiddelen

| DOMPERIDONE | |
|--|--|
| SKP (Wetenschappelijke bijsluiter) | Het wordt aanbevolen de orale vormen van Motilium® vóór de maaltijden in te nemen. Bij inname na de maaltijden wordt de absorptie van het geneesmiddel iets vertraagd. |
| UpToDate (online database) | Administer 15 to 30 minutes prior to meals and at bedtime if needed. |
| Farmacotherapeutisch Kompas (online database) | Dopamine-antagonist die de peristaltiek van maag en duodenum en de druk van de gastro-oesofageale sfincter doet toenemen en tevens de sfincter van de pylorus relaxeert. Hierdoor ontstaat een versnelde maaglediging, waardoor braken kan worden voorkomen; mogelijk speelt ook antagonisme van dopaminereceptoren in de chemoreceptor-triggerzone hierbij een rol. Het werkingsmechanisme berust waarschijnlijk op perifere antidopaminewerking. Bij voorkeur 15–30 min vóór elke maaltijd en vóór het slapengaan. |

⇒ *Voorstel voor praktijkadvies: 15 à 30 min voor de voeding innemen (en/of bij het slapengaan)*

| PROTONPOMPINHIBITOREN (PPI) ((es)omeprazole, lansoprazole, pantoprazole) | |
|---|---|
| Handbook of Drug Administration via Enteral Feeding Tubes (2011) ¹ | <ul style="list-style-type: none"> • <i>Omeprazole</i>: food may delay peak plasma concentration but does not affect the total absorption of omeprazole. • <i>Esomeprazole</i>: a prolonged break in feeding is not required. • <i>Lansoprazole</i>: the intake of food with lansoprazole slows down the absorption and decreases the bioavailability by about 50%; it is, therefore, recommended that lansoprazole is taken 1 hour before meals. • <i>Pantoprazole</i>: absorption is unaffected by food. |
| Drug-Nutrient Interactions in Patients Receiving Enteral Nutrition (2010) ² | Food may decrease the maximum plasma concentration of the PPI but the AUC is not significantly affected. Still, it is best to counsel patients to administer their PPI about one-half hour prior to meals if practical. If this is not possible, counsel patients to take their PPI at the start of the meal. Administer before meals to improve absorption and maximize clinical effect. |
| Wohlt et al. (2009) ³ | <ul style="list-style-type: none"> • <i>Omeprazole</i>: enteral nutrition should be held at least 1h before and 1h after the administration of each dose. • <i>Esomeprazole</i>: enteral nutrition should be held at least 1h before and 1h after dose administration. • <i>Lansoprazole</i>: enteral nutrition should be held at least 1h before and 1h after the administration of lansoprazole. • <i>Pantoprazole</i>: coadministration with food has no effect on pantoprazole pharmacokinetics. |
| Williams (2008) ⁴ | Feedings should be held for 3h before and 1h after medication administration. |
| www.bcfi.be | Gewijzigde resorptie van andere geneesmiddelen door verandering van de maag-pH (bv. verminderde resorptie van itraconazol, van ijzer en van bepaalde protease-inhibitoren en proteïne-kinase-inhibitoren) of door vorming van niet-resorbeerbare complexen met de antacida (bv. verminderde resorptie van tetracyclines en van chinolonen). Een interval van enkele uren tussen de innames is aangewezen. |
| Commentaren Medicatiebewaking 2014/2015 ⁵ | <p>Interactie beschreven met azoolantimycotica (itraconazol, ketoconazol, posaconazol): door stijging pH van de maag (onder invloed van het PPI), daling van de biologische beschikbaarheid van deze antimycotica, en dus ook daling effect =></p> <ul style="list-style-type: none"> • Ketoconazol en posaconazol: stop zo mogelijk tijdelijk gebruik PPI tijdens antimycoticumkuur OF vervang ketoconazol/posaconazol door ander antimycoticum • Itraconazol: vervang zo mogelijk itraconazol capsules door drankvorm OF stop zo mogelijk tijdelijk gebruik PPI |
| OPMERKING | <p><u>PPI's moeten 15 à 30 min voor het ontbijt ingenomen worden, want PPI's</u></p> <ul style="list-style-type: none"> • Zijn prodrugs die geactiveerd worden in zuur milieu • Inhiberen protonpompen irreversibel => daarom volstaat 1x daagse toediening (meestal) • Inhiberen enkel actieve protonpompen: Activering protonpompen gebeurt door voedselinname → daarom inname 15 à 30 min voor ontbijt; bij eten na een langere vastenperiode (nacht) wordt het grootste aantal protonpompen geactiveerd • Bij een maaltijd worden niet alle protonpompen geactiveerd + PPI korte T_{1/2}; daarom zijn meerdere doses PPI nodig om het maximaal zuurremmend effect te bereiken (= na ongeveer 1 week) |

| | |
|--|--|
| | <p>→ “The concept that PPIs inhibit only active pumps serves as the underpinning as how these agents should be administered. First, if possible, PPIs should be taken 30-60 min before breakfast since, following a prolonged fast the greatest number of pumps will be activated and thereby inhibited. Second, if higher dosages are needed, they should be split, keeping in mind the concept of administration time (i.e., before breakfast before dinner), as this will facilitate inhibition of more pumps.”⁶</p> |
|--|--|

⇒ *Voorstel voor praktijkadvies:*

- 15 à 30 min voor de 1^e voeding/ontbijt innemen.
- Indien PPI 2x/dag moet worden ingenomen: 15 à 30 min voor 1^e voeding/ontbijt en 15 à 30 min voor laatste voeding/avondmaal

| LEVOTHYROXINE | |
|--|---|
| Handbook of Drug Administration via Enteral Feeding Tubes (2011) ¹ | A prolonged break in feeding is not required; there is no documented interaction with food. |
| Handbook of Drug-Nutrient Interactions (2010) ⁷ | It is prudent to monitor thyroid function within several days for patients receiving levothyroxin sodium who start enteral nutrition therapy since this is a poorly studied interaction, but it is most important if the formula contains soy products. ² Absorption is increased in the fasting state; take at same time daily and consistently with respect to meals. ⁷ |
| Wohlt et al. (2009) ³ | <ul style="list-style-type: none"> ➤ For use for less than seven days, no medication administration changes are needed (with regard to tube feeding). ➤ For use for seven days or longer, tube feedings should be held 1h before and after administration of a dose. Thyroid function should be monitored weekly. |
| <u>www.bcfi.be</u> | <ul style="list-style-type: none"> • Eén enkele toediening daags van levothyroxine volstaat, met inname 30 minuten vóór het ontbijt, zonder andere geneesmiddelen • Verminderde resorptie van levothyroxine bij associëren met ijzer, calcium en antacida; een interval van enkele uren tussen de innames is aangewezen |
| Commentaren Medicatiebewaking 2014/2015 ⁵ | <p>Hoewel de interactie van levothyroxine met complexerende verbindingen (bv. ijzer, aluminium-en magnesium-bevattende antacida, calciumcarbonaat) bij weinig patiënten is beschreven, ligt er een duidelijk mechanisme aan ten grondslag. Het optreden van een relevant probleem bij gelijktijdige inname van levothyroxine met complexerende verbindingen is aannemelijk. Daarom is het zinvol gelijktijdige inname van levothyroxine en complexerende verbindingen te vermijden. Levothyroxine moet op een nuchtere maag (een half uur vóór het ontbijt) worden ingenomen. Het is raadzaam de complexerende verbinding minimaal 3u na levothyroxine in te nemen.</p> <p>Voor bepaalde metaalverbindingen wordt soms inname een half uur vóór de maaltijd of inname op de nuchtere maag geadviseerd (bv. bij bepaalde ijzerpreparaten). Gezien de grote kans op een slechtere resorptie wanneer levothyroxine niet op de nuchtere maag wordt ingenomen en de bijbehorende kans op schommelingen in de schildklierfunctie, dient het belang van een adequate opname van levothyroxine te prevaleren. Daarom zal voor sommige metaalverbindingen mogelijk moeten worden afgeweken van het standaard innameadvies.</p> |

⇒ *Voorstel voor praktijkadvies:*

- 30 min voor de 1^e voeding/ontbijt, zonder andere geneesmiddelen
- Vermijd gelijktijdige inname met complexerende verbindingen (ijzer, aluminium, magnesium, calcium) => levothyroxine min 3u voor complexerende verbinding

| CHINOLONES (ciprofloxacin, levofloxacin, ofloxacin, moxifloxacin) | |
|---|---|
| Handbook of Drug Administration via Enteral Feeding Tubes (2011) ¹ | <ul style="list-style-type: none"> • <i>Ciprofloxacin</i>: although there is no evidence that a break in feeding is beneficial, it would appear logical to administer the dose during a break in feeding where possible. / Allow a break in feeding if possible. • <i>Levofloxacin</i>: stop feed 1h pre-dose and restart feed 2h post dose. • <i>Ofloxacin</i>: stop feed 1h pre-dose and restart feed 2h post dose. |
| Drug-Nutrient Interactions in Patients Receiving Enteral Nutrition (2010) ² | <p>Hold formula for at least 1h before and 2h after drug administration (ciprofloxacin).</p> <p>Although less hydrophilic quinolones appear to be less affected by an interaction with enteral formula, the safest approach is to hold formula for at least 1 h before and 2 h after quinolone administration through a feeding tube.</p> |
| Wohlt et al. (2009) ³ | <ul style="list-style-type: none"> • <i>Ciprofloxacin</i>: enteral nutrition may be held for 1h before and 2h after ciprofloxacin administration. • <i>Levofloxacin</i>: the tablets can be administered without regard to food. It is recommended that levofloxacin oral solution be taken 1h before or 2h after eating. • <i>Moxifloxacin</i>: no drug administration changes are needed (with regard to food). |
| Williams (2008) ⁴ | <p>A common practice is to hold enteral nutrition for at least 1h before and 2h after quinolone dosing, although this may not apply to moxifloxacin. Another option is to increase the dose of ciprofloxacin when given concurrently with enteral nutrition.</p> |
| Belgische gids voor anti-infectieuze behandeling in de ambulante praktijk (editie 2012, BAPCOC) – steekkaart | <ul style="list-style-type: none"> • Norfloxacin en ciprofloxacin: <ul style="list-style-type: none"> ○ Min. 1u voor en 2u na de maaltijd (Ciprofloxacin kan evt. tijdens de maaltijd om maaglast te voorkomen) ○ Min. 2u voor polyvalente kationen (ijzer, aluminium, magnesium, calcium) of melkproducten • Levofloxacin, moxifloxacin en ofloxacin: <ul style="list-style-type: none"> ○ Geen invloed van de maaltijd ○ Geen invloed melkproducten ○ Min. 2u voor polyvalente kationen (in geval van moxifloxacin: 6 uur voor of na polyvalente kationen) |
| www.bcfi.be | <p>Verminderde resorptie van chinolonen bij gelijktijdige inname van voedsel (o.a. melk en melkproducten), van calcium-, magnesium-, ijzer- of aluminiumzouten en van strontiumranelaat.</p> |
| Commentaren Medicatiebewaking 2014/2015 ⁵ | <ul style="list-style-type: none"> • Bij combinatie van chinolonen met complexerende verbindingen zoals ijzer- en zinkpreparaten, calcium: verminderde enterale resorptie van het chinolon, met als mogelijk gevolg een verminderd antibioticus effect => overweeg tijdelijk stoppen complexerende verbinding tot na antibioticumkuur OF dien de complexerende verbinding ten minste 2u na het chinolon toe • Gelijktijdige inname van aluminium- en/of magnesium-bevattende verbindingen leidde bij ciprofloxacin, levofloxacin, norfloxacin en ofloxacin tot een sterke vermindering van de biologische beschikbaarheid. Uit de beschikbare gegevens komt naar voor dat inname van het chinolon 2u voor en ten minste 4 tot 6u na de aluminium- en/of magnesium-bevattende verbinding de biologische |

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| | <p>beschikbaarheid het minst beïnvloedt. Gezien de sterke binding en de ingewikkelde innameschema's die nodig zijn bij gecombineerd gebruik, verdient het de voorkeur het aluminium- en/of magnesium-bevattende verbinding (tijdelijk) te stoppen als een chinolon-antibioticum is geïndiceerd OF om één van beide middelen te vervangen door een alternatief.</p> <ul style="list-style-type: none"> • Moxifloxacin-complexerende verbinding: overweeg tijdelijk stoppen complexerende verbinding tijdens moxifloxacin kuur OF dien moxifloxacin ten minste 6u voor of 6u na complexerende verbinding in. (Opm.: calcium daarentegen heeft geen invloed op de biologische beschikbaarheid van moxifloxacin) |
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⇒ *Voorstel voor praktijkadvies:*

- Stop de voeding minstens 1u voor tot 2u na de toediening van het chinolon
- Vermijd gelijktijdige inname met complexerende verbindingen (ijzer, aluminium, magnesium, calcium) en melkproducten => dien het chinolon ten minste 2u voor de complexerende verbinding toe (uitzondering: in geval van moxifloxacin 6u interval)

| TETRACYCLINES (doxycycline, minocycline, tetracycline) | |
|---|---|
| Handbook of Drug Administration via Enteral Feeding Tubes (2011) ¹ | Doxycycline: Unlike with other tetracyclines, doxycycline absorption is not influenced by simultaneous ingestion of food or milk. A prolonged break in feeding does not appear to be necessary; however, it is possible that there may be a reduction in absorption and therefore the dose should be administered during a break in feeding if practical. Alternatively, the higher end of the dose range should be used. (De andere tetracyclines zijn niet opgenomen in dit naslagwerk) |
| Handbook of Drug-Nutrient Interactions (2010) ⁷ | Absorption is significantly impaired by iron/milk/food. |
| Belgische gids voor anti-infectieuze behandeling in de ambulante praktijk (editie 2012, BAPCOC) – steekkaart | <ul style="list-style-type: none"> • Min. 1u voor en 2u na de maaltijd. • Met groot glas water en 30min. Niet gaan liggen. • Vermijd polyvalente kationen (ijzer, aluminium, magnesium, calcium) en melkproducten. <ul style="list-style-type: none"> ➢ Doxycycline en minocycline: tijdens de maaltijd indien maaglast. Minder invloed van melkproducten |
| www.bcfi.be | <ul style="list-style-type: none"> • Verminderde resorptie van tetracyclines bij gelijktijdige inname van voedsel (o.a. melk en melkproducten), van calcium-, magnesium-, ijzer- of aluminiumzouten en van strontiumranelaat; een interval van enkele uren tussen de innames is aangewezen • Verminderde resorptie van ijzer bij gelijktijdige inname van tetracyclines; een interval van enkele uren tussen de innames is aangewezen |
| Commentaren Medicatiebewaking 2014/2015 ⁵ | Bij combinatie van tetracyclines met complexerende verbindingen (bv. ijzer, aluminium, magnesium): verminderde resorptie tetracycline, met als mogelijk gevolg een verminderd therapeutisch effect => overweeg tijdelijk stoppen van de complexerende verbinding OF vervang één van beide middelen OF dien het tetracycline ten minste 2u voor de complexerende verbinding toe. |
| OPMERKING (voor personen die het geneesmiddel oraal innemen) | Om het risico op irritatie en ulceratie van de slokdarm te verminderen is de toediening van een adequate hoeveelheid vloeistof (100 ml of een half glas) met de tablet- of capsulevormen van de geneesmiddelen van de klasse der tetracyclines aanbevolen. Men moet minstens 30 minuten wachten alvorens te gaan liggen. |

⇒ *Voorstel voor praktijkadvies:*

- Stop de voeding minstens 1u voor tot 2u na de toediening van het tetracycline
- Vermijd gelijktijdige inname met complexerende verbindingen (ijzer, aluminium, magnesium, calcium) en melkproducten => dien het tetracycline ten minste 2u voor de complexerende verbinding toe

| PENICILLINE V (= fenoxymethylpenicilline) | |
|---|---|
| Handbook of Drug Administration via Enteral Feeding Tubes (2011) ¹ | / (geneesmiddel niet opgenomen in dit naslagwerk) |
| Drug-Nutrient Interactions in Patients Receiving Enteral Nutrition (2010) ² | Hold formula for at least 1h before and 2h after drug administration |
| Wohlt et al. (2009) ³ | Enteral nutrition should be held 1h before and 2h after dose administration. Higher doses may be administered or substitute with amoxicillin. |
| Belgische gids voor anti-infectieuze behandeling in de ambulante praktijk (editie 2012, BAPCOC) – steekkaart | Min. 30min. vóór en 2u na de maaltijd, tenzij maaglast. |
| <u>www.bcfi.be</u> | Penicilline V (fenoxymethylpenicilline) is zuurbestendig; het kan oraal worden toegediend maar de resorptie is onvolledig. Toediening 1 uur vóór de maaltijd is aangewezen. |

⇒ *Voorstel voor praktijkadvies:* Stop de voeding minstens 1u voor tot 2u na de toediening van penicilline V

| BISFOSFONATEN | |
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| Handbook of Drug Administration via Enteral Feeding Tubes (2011) ¹ | <ul style="list-style-type: none"> • Alendronate: <ul style="list-style-type: none"> ○ Absorption of alendronic acid is reduced significantly if food is ingested within 30 minutes of oral dosing. Absorption is negligible if it is taken with or after food. ○ Owing to the risks of oesophageal damage, alendronate should be used with caution via an enteral feeding tube, especially in patients with delayed gastric emptying at risk of oesophageal reflux and those patients unable to sit or stand upright. ○ If alendronate is administered via a feeding tube, the once-weekly formulation should be used. The solution is the best preparation available for administration via an enteral feeding tube, or the tablet should be dispersed in water and administered immediately then flushed with at least 50 mL of water. This should be administered first thing in the morning after rising and the patient should remain sitting upright or standing for 30 minutes after the dose is given, this allows for the longest break without food; if the patient is on an overnight feed it may be appropriate to dose in the evening. Enteral feed should be stopped prior to administration for as long as practicable, and should not be re-started for at least 30 minutes after the dose. • Risedronate: <ul style="list-style-type: none"> ○ Bioavailability is decreased when risedronate sodium is administered with food. ○ Owing to the risks of oesophageal damage, risedronate sodium should be used with caution via an enteral feeding tube, especially in patients with delayed gastric emptying at risk of oesophageal reflux and in those patients unable to sit or stand upright. ○ If risedronate sodium is administered via a feeding tube, the once-weekly preparation should be used, owing to the lower incidence of GI related side-effects.¹⁰ The tablet should be dispersed in 10 mL of water and administered immediately, then flushed with at least 50 mL of water. This should be administered first thing in the morning after rising and the patient should remain sitting upright or standing for 30 minutes after the dose is given. Enteral feed should be stopped 2 hours prior to administration, and should not be re-started for at least 2 hours after the dose. |
| UpToDate (online database) | <ul style="list-style-type: none"> • Bisphosphonates should be taken alone on an empty stomach first thing in the morning with at least 240 mL water. After administration, the patient should not have food, drink, medications, or supplements for at least one-half hour (alendronate, risedronate) or one hour (ibandronate). The reason for taking 240 mL water is to minimize the risk of the tablet getting stuck in the esophagus. The reason for taking the medication while fasting and waiting one-half hour until eating or drinking is that bioavailability may be seriously impaired by ingestion with liquids other than plain water, such as mineral water, coffee, or juice, or by retained gastric contents, as with insufficient fasting time or gastroparesis, or by eating or drinking too soon afterwards. • Patients should remain upright (sitting or standing) for at least 30 minutes after administration to minimize the risk of reflux. |

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| www.bcfi.be | <ul style="list-style-type: none"> • Voor alle bisfosfonaten is de biologische beschikbaarheid na orale toediening laag; zij moeten nuchter worden ingenomen met (niet-bruisend en calciumarm) water en er moet minstens 30 minuten gewacht worden vooraleer voedsel, drank, een ander geneesmiddel of calcium wordt ingenomen. • Gezien het risico van slokdarmletsels na orale inname neemt men best de tabletten in met minstens 100 ml water, wacht men best 1 uur of tot na de inname van voedsel alvorens te gaan liggen, en vermijdt men de tabletten op te zuigen of stuk te bijten. |
| Farmacotherapeutisch Kompas (online database) | In verband met het risico van oesofagiale irritatie of bijwerkingen: de tabletten direct na het opstaan in hun geheel uitsluitend met een vol glas leidingwater innemen ten minste een half uur voor het eerste eten of drinken of de eerste geneesmiddelen van die dag. Niet gaan liggen < 30 min na inname van de tabletten en daarna alleen nadat er iets gegeten is. |
| Commentaren Medicatiebewaking 2014/2015⁵ | <p>Bij gelijktijdige inname van bisfosfonaten en complexerende verbindingen (antacida; verbindingen met calcium, ijzer, magnesium, zink): sterk verminderde resorptie van bisfosfonaat, waardoor het therapeutisch effect verdwijnt => complexerende verbinding innemen</p> <ul style="list-style-type: none"> - minstens 0,5u na gebruik alendroninezuur, ibandroninezuur 50mg, risedroninezuur - minstens 1u na gebruik ibandroninezuur 150mg - minstens 2u na gebruik clodroninezuur, etidroninezuur |

⇒ Voorstel voor praktijkadvies:

- 30 min voor 1^e voeding/ontbijt in rechtop zittende houding, met een groot glas leidingwater; niet neerliggen en wachten met eten & drinken tot 30 min na inname bisfosfonaat
- Wacht met innemen van andere geneesmiddelen tot 30 min na inname bisfosfonaat

| IJZER | |
|--|--|
| Handbook of Drug Administration via Enteral Feeding Tubes (2011) ¹ | Iron is best absorbed when taken between meals; however, owing to the high incidence of gastrointestinal side-effects, it is recommended that iron preparations be taken with food. |
| British National Formulary | Although iron preparations are best absorbed on an empty stomach they can be taken after food to reduce gastro-intestinal side-effects; they may discolour stools |
| UpToDate (online database) | <ul style="list-style-type: none"> • Iron salts should not be given with food because phosphates, phytates, and tannates in food bind the iron and impair its absorption. A number of other factors can inhibit the absorption of iron salts, including antacids, H2 receptor blockers, proton pump inhibitors, calcium-containing foods and beverages, calcium supplements, certain antibiotics (eg, quinolones, tetracycline), and the ingestion of iron along with cereals, dietary fiber, tea, coffee, eggs, or milk. • Iron should be given two hours before, or four hours after, ingestion of antacids. • Iron is best absorbed as the ferrous (Fe++) salt in a mildly acidic medium. As a result, we usually add a 250 mg ascorbic acid tablet or a half-glass of orange juice at the time of iron administration to enhance the degree of iron absorption. • Estimates are that 30 percent or more complain of nausea, constipation, diarrhea, epigastric distress and/or vomiting after taking various oral iron preparations. Therefore, iron may be taken with meals, although this will decrease absorption somewhat. |
| <u>www.bcfi.be</u> | <ul style="list-style-type: none"> • Verminderde resorptie van o.a. bisfosfonaten, chinolonen, levodopa, levothyroxine en tetracyclines bij gelijktijdige inname van ijzer • Verminderde resorptie van ijzer bij gelijktijdige inname van o.a. antacida, calciumzouten, tetracyclines en chinolonen • Een interval van minstens 2 à 3 uur tussen inname van ijzer en inname van de andere geneesmiddelen is aangewezen • Toedienen tijdens of na de maaltijd vermindert de gastro-intestinale last maar vermindert ook de resorptie |
| Commentaren Medicatiebewaking 2014/2015 ⁵ | <p>Interacties beschreven met o.a.:</p> <ul style="list-style-type: none"> • Antacida en calciumcarbonaat: ijzer minstens 1,5 tot 2u vóór antacidum/calciumcarbonaat ¹ • Bisfosfonaten: ijzer minstens 0,5u na inname bisfosfonaat • Chinolonen: ijzer minstens 2u na het chinolon (of 6u in geval van moxifloxacin) ² • Tetracyclines: ijzer minstens 2u na tetracycline (of in geval van doxycycline: stop ijzer (tijdelijk) of vervang één van beide middelen door een alternatief) ² • Levothyroxine: ijzer minstens 3u na levothyroxine innemen <p>OPM.: Bij ijzer met gereguleerde afgifte:</p> <p>¹ als antacidum/calciumcarbonaat 1x/dag wordt gegeven: ijzer 's morgens en antacidum/calciumcarbonaat 's avonds OF overschakelen naar ijzer zonder gereguleerde afgifte</p> <p>² overschakelen naar ijzer zonder gereguleerde afgifte</p> |

⇒ Voorstel voor praktijkadvies:

- Beste absorptie bij inname op nuchtere maag. Echter, er treden dan vaak gastro-intestinale bijwerkingen op; dit kan gereduceerd worden door inname van ijzer met of net na de voeding.
- Interval van 2 à 3 u tussen inname ijzer en inname andere geneesmiddelen (voor meer specifieke adviezen zie bijlage: IJzer, Commentaren Medicatiebewaking)

N.B.: voor ijzer met vertraagde afgifte (Fero-Grad 500®, Fero-Gradumet®, Tardyferon®) wordt mogelijks best overgeschakeld naar ijzer zonder vertraagde afgifte (voor meer specifieke adviezen zie bijlage: IJzer, Commentaren Medicatiebewaking)

| THEOPHYLLINE | |
|---|--|
| Handbook of Drug Administration via Enteral Feeding Tubes (2011) ¹ | Despite the lack of consistent data, it is currently recommended to give theophylline during a break in feeding where possible. If this is not practical, ensure that doses are given consistently with respect to feed times. |
| Drug-Nutrient Interactions in Patients Receiving Enteral Nutrition (2010) ² | At this time, it is difficult to justify holding formula unless the patient has experienced erratic theophylline serum concentrations or inadequate disease control after initiation of enteral nutrition therapy. |
| Wohlt et al. (2009) ³ | Enteral nutrition should be held 1h before and 1h after dose administration. Theophylline levels should be monitored closely. |

⇒ *Voorstel voor praktijkadvies:* Indien mogelijk, dien theofylline toe tijdens een pauze in de voeding. Indien dit praktisch niet haalbaar is, geef altijd op dezelfde manier ten aanzien van voeding (tijdens of erbuiten).

| WARFARINE | |
|---|---|
| Handbook of Drug Administration via Enteral Feeding Tubes (2011) ¹ | The variable vitamin K content in the diet and enteral feed can result in fluctuations in INR until the dietary regimen is stabilized. Where possible, give the warfarin dose during a break in the feeding regimen; when this is not possible, ensure that the timing of feed and dose are kept as stable as possible. |
| Drug-Nutrient Interactions in Patients Receiving Enteral Nutrition (2010) ² | Hold formula for at least 1h before and after warfarin administration |
| Wohlt et al. (2009) ³ | <ul style="list-style-type: none"> ➤ Warfarin absorption is unaffected by food. Therefore, no medication administration changes are needed. ➤ Alternatively, enteral nutrition may be held 1h before and 1h after the administration of a warfarin dose. Formulas containing soy proteins should be avoided. <p>With either method, the International Normalized Ratio should be monitored closely.</p> |
| Williams (2008) ⁴ | The prothrombin time, or International Normalized Ratio, should be closely monitored when warfarin is used concurrently with enteral nutrition. Alternatively, continuous enteral feedings may be held for at least 1h before and after warfarin administration to help lessen the interaction. |

⇒ *Voorstel voor praktijkadvies:* Indien mogelijk, dien warfarine toe tijdens een pauze in de voeding (voeding stoppen 1u voor tot 1u na toediening warfarine). Indien niet mogelijk, zorg dat inname warfarine altijd hetzelfde gebeurt m.b.t. voeding (= timing van voeding en toediening van warfarine altijd op dezelfde manier). Monitor INR.

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Curriculum Vitae

PERSONAL INFORMATION

Name: Elke Joos
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EDUCATION

2005 – 2010 Master of Science in Pharmaceutical Care
 Ghent University
 2000 – 2005 Sciences-Mathematics
 College O.-L.-V.-ten-Doorn, Eeklo

PUBLICATIONS

Scientific publications in peer-reviewed journals

Joos E, Mehuys E, Van Bocxlaer J, Remon JP, Van Winckel M, Boussery K. *Medication Management in Belgian Residential Care Facilities for Individuals With Intellectual Disability: An Observational Study*. Journal of Policy and Practice in Intellectual Disabilities 2014;11(1):27-33.

Joos E, Mehuys E, Van Bocxlaer J, Remon JP, Van Winckel M, Boussery K. *Drug administration via enteral feeding tubes in residential care facilities for individuals with intellectual disability: an observational study*. Journal of Intellectual Disability Research 2015 Mar;59(3):215-25.

Joos E, Van Tongelen I, Wijnants K, Mehuys E, Van Bocxlaer J, Remon JP, Grypdonck M, Van Winckel M, Boussery K. Drug administration via enteral feeding tube in residential care facilities for individuals with intellectual disability: a focus group study on guideline implementation. Accepted for publication in *Journal of Intellectual Disabilities*.

Joos E, Verbeke S, Mehuys E, Van Bocxlaer J, Remon JP, Van Winckel M, Boussery K. Medication administration via enteral feeding tube: a survey of pharmacists' knowledge. Accepted for publication in *International Journal of Clinical Pharmacy*.

Joos E, Mehuys E, Remon JP, Van Winckel M, Boussery K. Analysis of drug use in institutionalized individuals with intellectual disability and tube feeding. Submitted to *Acta Clinica Belgica*, under review.

Joos E, Mehuys E, Van Bocxlaer J, Remon JP, Van Winckel M, Boussery K. Knowledge of staff members of residential care facilities for individuals with intellectual disability on medication administration via enteral feeding tube. Submitted to *Journal of Intellectual Disability Research*, under review.

CONFERENCE PARTICIPATIONS

Oral presentations

- BESPUGHAN, Autumn Meeting Belgian Society for Paediatric Gastroenterology, Hepatology and Nutrition. November 19, 2011. Ghent, Belgium.
Medication administration in institutions in Flanders: guidelines and actual practice.
- 16th forum of pharmaceutical sciences. May 8, 2012. Blankenberge, Belgium.
Organization of the medication management process in institutions for individuals with intellectual disability.
- Prisma Symposium. January 15, 2013. Amersfoort, Netherlands.
Geneesmiddelen-toediening via sonde in instellingen voor personen met een beperking.
- Flemish Welfare Association (Vlaams Welzijnsverbond). March 11, 2014. Brussels, Belgium.
Medicatie-toediening in instellingen voor personen met een mentale beperking.
- Prisma Symposium. May 20, 2014. Amersfoort, Netherlands.
Geneesmiddelen-toediening via sonde in instellingen voor personen met een mentale beperking: kwalitatief onderzoek naar barrières voor het volgen van de aanbevelingen.
- Third Belgian Pharmaceutical Care Symposium. February 7, 2015. Brussels, Belgium.
Drug administration via enteral feeding tubes in residential care facilities for individuals with intellectual disability: an observational and a focus group study.
- Prisma Symposium. May 19, 2015. Amersfoort, Netherlands.
Kennis van personeelsleden van instellingen voor personen met een mentale beperking over medicatie-toediening via sonde.

Poster presentations

- BVKB-SBBC Symposium. October 17, 2009. Yvoir, Belgium.
Simultaneous quantification of testosterone and androstenedione in human serum using LC-MS/MS
- Second Belgian Pharmaceutical Care Symposium. September 15, 2012. Brussels, Belgium.
Organization of the medication management process in institutions for individuals with intellectual disability.
- Third Belgian Pharmaceutical Care Symposium. February 7, 2015. Brussels, Belgium.
Adviesverstrekking in de apotheek omtrent geneesmiddel-alcohol interacties.

- 12th Congress of the European Association for Clinical Pharmacology and Therapeutics (EACPT 2015). June 27-30, 2015. Madrid, Spain.

Drug administration via enteral feeding tube in residential care facilities for individuals with intellectual disability.

Abstract published as: Joos E, Mehuys E, Van Bocxlaer J, Remon JP, Van Winckel M, Boussery K. *Drug Administration Via Enteral Feeding Tube In Residential Care Facilities for Individuals With Intellectual Disability*. Clinical Therapeutics August 2015 Volume 37, Issue 8, Supplement, Page e27.

DOI: <http://dx.doi.org/10.1016/j.clinthera.2015.05.085>

Other attended conferences

- First Belgian Pharmaceutical Care Symposium. September 18, 2010. Brussels, Belgium.
- 15th forum of pharmaceutical sciences. Spa, Belgium.
- Prisma Symposium. May 17, 2011. Amersfoort, Netherlands.

TRAINING

- Basisassistententraining. October 11-12, 2011. Ghent, Belgium
- Course '*Clinical studies: study design, implementation and reporting*'. August 29-30, 2012. Ghent, Belgium.
- Masterclass '*Farmaceutische zorg voor mensen met een verstandelijke beperking*'. 2012-2013 (27/11/2012, 08/01/2012, 12/02/2013, 16/04/2013). Driebergen, Netherlands.
- Summer-course '*4 days of qualitative research*'. August 28-31, 2013. Antwerp, Belgium.

THESIS SUPPORT

Guidance of Master thesis students (MSc in Pharmaceutical Care):

- De implementatie van geneesmiddelenverdeling via een geautomatiseerd distributiesysteem in instellingen voor personen met een beperking. Elke Lelieur, 1st Master Pharmaceutical Care (2010-2011).
- Toediening van medicatie via sonde bij kinderen met een mentale beperking in gespecialiseerde instellingen. Liesbeth Bogaert, 1st Master Pharmaceutical care (2011-2012).
- Adviesverstrekking in de apotheek omtrent geneesmiddel-alcohol interacties. Sophie Bruneel, 1st Master Pharmaceutical Care (2012-2013).
- Medicatietoediening via sonde bij geïnstitutionaliseerde personen met een mentale beperking: de rol van het verzorgend personeel. Karen Wijnants, 1st Master Pharmaceutical Care (2013-2014).

- Kennis en adviserende rol van de officina-apotheker omtrent medicatietoediening via sonde aan personen met een mentale beperking. Stacey Verbeke, 1st Master Pharmaceutical Care (2013-2014).
- Doseerinstructies bij afleveren van vloeibare geneesmiddelvormen aan kinderen. Jan Venneman, Pharmaceutical Care (2014-2015).

